McGraw-Hill DIGEST

JULY 1949

BUSINESS · ENGINEERING · INDUSTRY

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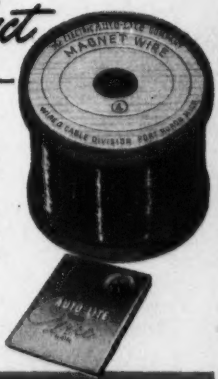

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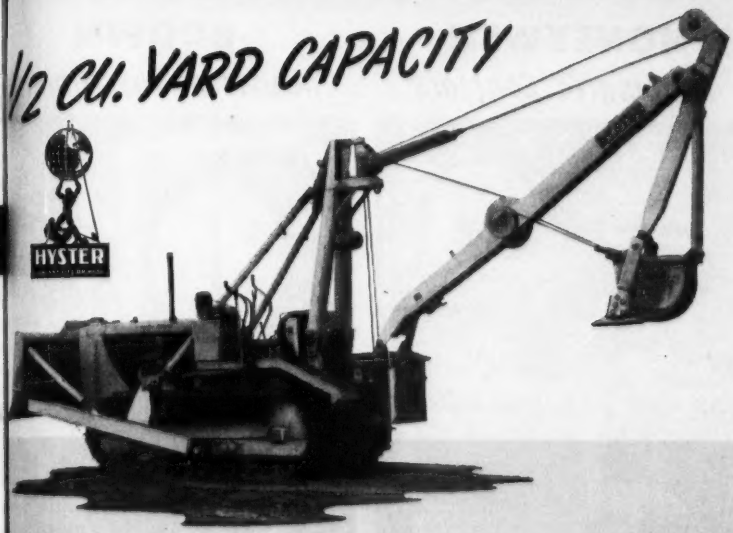

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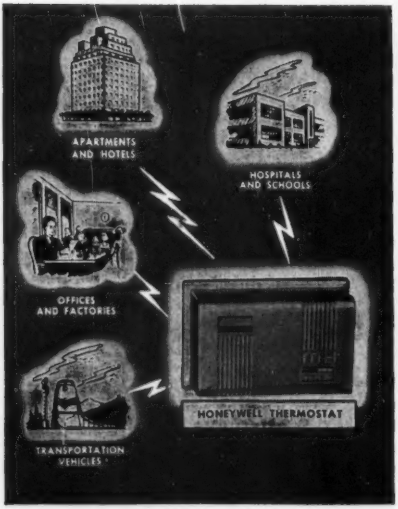

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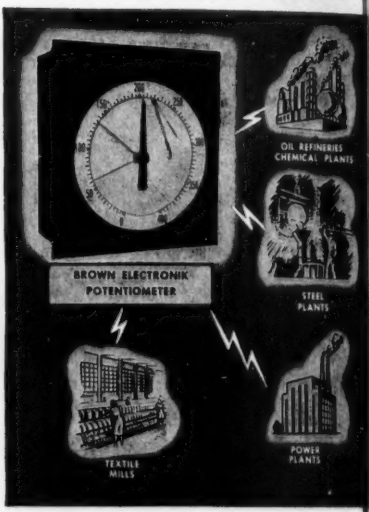

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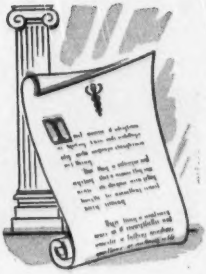

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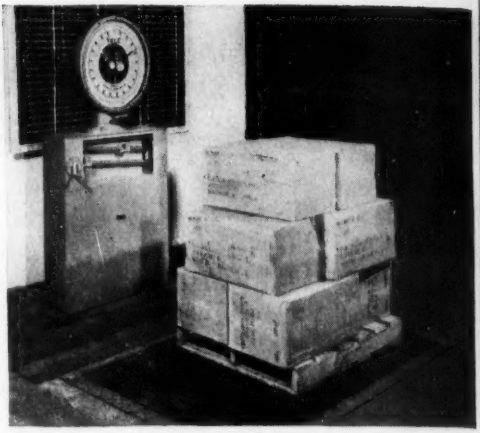

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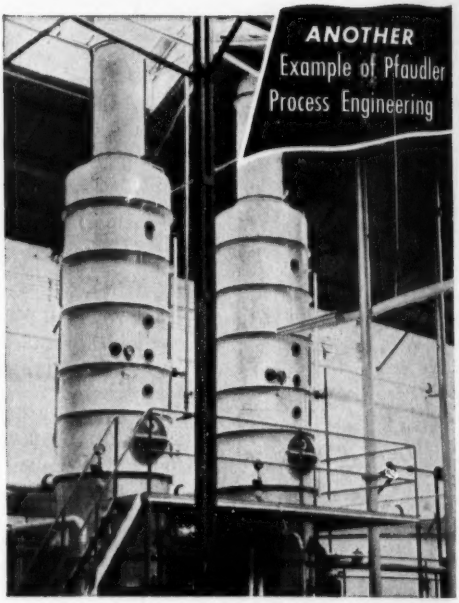

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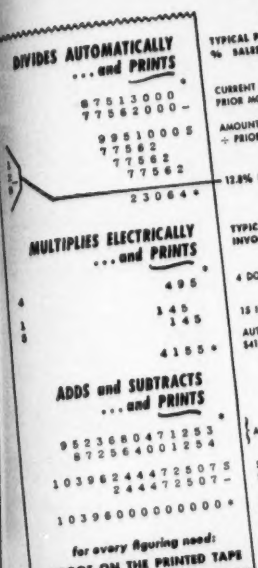

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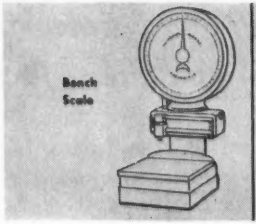

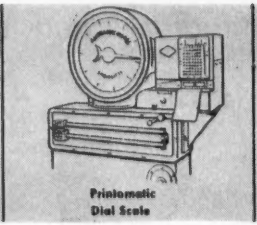

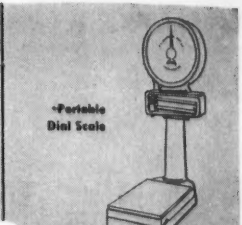

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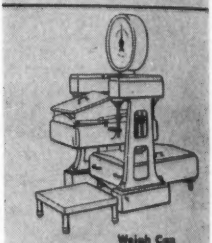

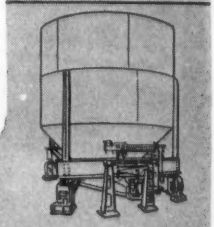

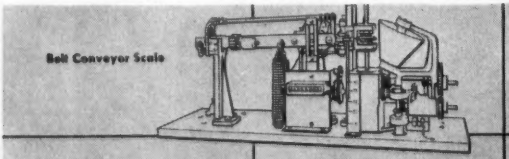

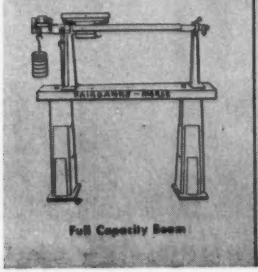

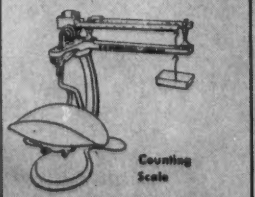

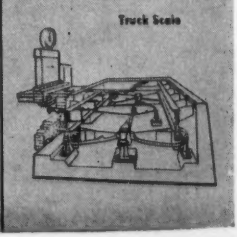

Business Trends

PRODUCTION OF GOODS in the U. S. is slipping more rapidly than was expected earlier this year. The index of industrial production for April, announced in late May, stood at 179 (1935-39=100), as compared with 184 for the previous month and 195 for 6 months before.

Consumers are living off inventories in expectation of lower prices. Nonferrous metal buyers with prices even lower than the month before (see McG-H Digest, June, p15) are staying out of the market. But soon they may be forced back in to buy for actual production needs, thereby giving some firmness once again to prices.

The dull copper market, with copper at a reduced price but still considered too high by the trade (expecting 12-14¢ price) is causing shutdown of marginal, high-cost producers and curtailed operation for other producers. Kennecott Copper Corp., for example, is cutting back from 48 hours to 40 hours a week and closing 2 days out of every 14 days.

The steel operating rate too may be signaling further declines in demand for industrial commodities in general. At the end of May, the operating rate was 95% of rated capacity—down from 102% in only 2 months and trending still further downward. An outstanding case—at Republic Steel Corp., world's largest producer of alloy steel, production of these steels has been trimmed to 50% of capacity, as compared with 100% a year ago.

Immediate cause of the lower steel operating rate is believed to be the reduction of customer inventories to minimum levels. But the operating rate by the end of the third quarter should reflect a balance between orders and customer production. Present estimates for the rate at that time vary widely—some as low as 80% with a 75% rate estimated for the end of the year.

EXPORTS FROM THE U. S., despite declining domestic business, continues good (see p21). Basic changes in U. S. export control policy are affecting the distribution of the export goods. Licensing requirements no longer are a means of conserving supplies of scarce goods.

They now serve as a weapon for defense. They bar the movement of certain goods to Russia and her satellite nations. Some strategic materials—carbon black, silicone greases, potassium perchlorate—have been returned to control although they are in ample supply.

Eighty percent of all items now under control are there for strategic rather than supply reasons. And you can look for the list to grow, not to shrink. Recent changes in commodity groups include: removal of quotas on petroleum products, quotas being removed gradually on steel products, non-ferrous metal quotas lifted except for aluminum, industrial-chemical list revised to agree with their individual strategic importance.

Business Trends (Continued)

BRITISH EXPORT SLUMP during April was of ominous significance to British manufacturers and brought forth gloomy predictions that the trend would continue downward. Forgotten entirely, or almost so, was the high total in March. Blamed for the sharp drop—from £149-million to £128-million in 1 month—were high prices of goods, lack of salesmanship, buyer resistance, competition, import restrictions.

Chiefly blamed were high prices, thereby once again reviving rumors of an early devaluation of the pound in terms of dollars. This points up the battle lines forming in Europe over foreign-exchange rates.

Almost all continental members of OEEC complain that as long as sterling is overvalued they can export to, but not import from, the sterling zone. This increases their idle sterling balances, forces Britain to insist even more so on bilateral trading. ECA officials also look on exchange-rate reform as necessary and may tie it in with ERP intra-European payments. The present plan, which was set up last year, expires the end of June. To a large extent, that plan failed to help stabilize currencies and thus stimulate trade.

Britain opposes devaluation of the pound. All signs point to some readjustment of European currencies in relation to the pound. Possible then is a revaluation of the pound to the dollar. The alternative is continuing bilateral arrangements to which the U. S. is unalterably opposed. Economic union cannot even be thought of until currencies are revalued and stabilized. For France, this means building up gold reserves; for Britain, drastic curtailment of sterling balances.

BRAZIL MAKES BUSINESS HISTORY is the reaction to her pledge to the UN on treatment of foreign capital: support of duty-free imports of capital equipment for use in foreign enterprises, tax exemption for profits of such concerns, and guarantees on transfer of earnings.

The Brazilian proposals were presented, in the form of a resolution to the UN Economic and Employment Commission, as inducements to attract capital to underdeveloped countries under President Truman's world-development (point four) plan. These provisions would go far to create an economic climate attractive to private foreign capital.

BUYERS AND SELLERS of ECA goods are faced with a new set of pricing rules. Starting July 1, ECA will not finance any purchase here if the price exceeds that of a comparable sale for domestic use plus the exporter's differential.

Delivered price of an offshore purchase must not exceed the U. S. market price plus delivered transportation charges or the market price in the supplying country—whichever is lower. Farm-commodity yardstick will be bid-and-asked quotation at time of purchase.

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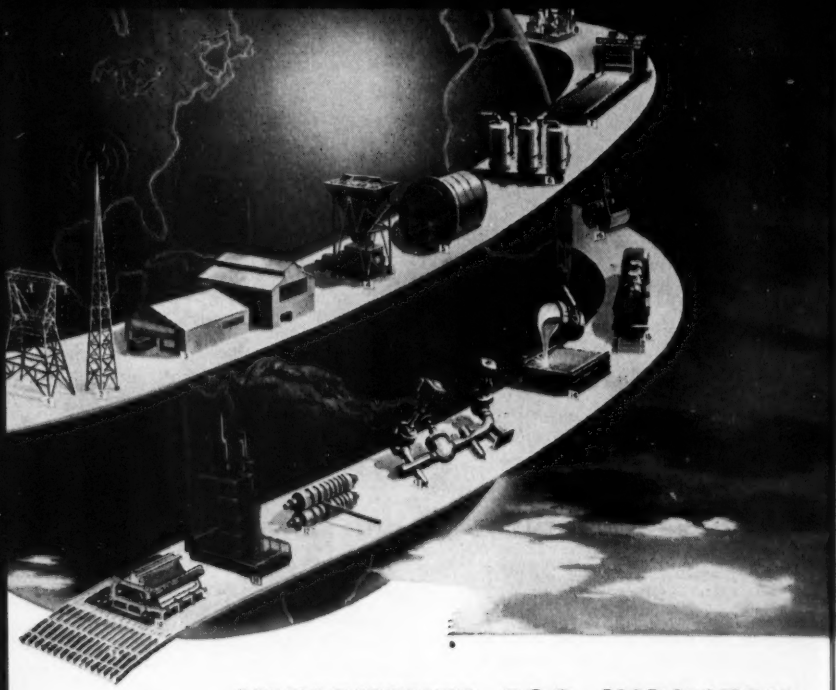

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Washington Report

NEW U. S.-URUGUAY COMMERCIAL TREATY is one you should look at—and study. The U. S. State Department considers it a model for new bi-lateral agreements necessary to put across Truman's "Point Four" development program for under-developed countries.

The reason is this: Existing "Friendship, Commerce, and Navigation" treaties are mostly last century affairs, cover problems of pre-war days. What is needed today, as the U. S. sees it, are additional provisions to cover private capital investment in a period of protective nationalism—exchange restriction, insistence upon native management, political expropriations.

The U. S. is not trying to prevent other governments from protecting themselves against foreign—in this case U. S.—investors by attempting to ban expropriation. Rather, the new treaties seek to set up rules ahead of time for cases where a nation has to expropriate. Thus, in the Uruguayan treaty, there is nothing that impinges on the right of Uruguay to take over a U. S.-owned business. What it does is to stipulate that no U. S. property may be expropriated without prior agreement on price and terms of payment.

Other samples from the new treaty:

(1) Agreement by Uruguay not to discriminate against U. S. investors as compared to other foreigners as well as her own nationals.

(2) Agreement to give U. S. business a reasonably free hand to bring in top executive and technical personnel.

(3) Agreement on just what degree of convertibility private investors can be assured with respect to the money returns from operations—interest and dividends.

The Uruguayan treaty will be followed by others as fast the State Department can set up negotiations. In prospect: Brazil, Chile, Mexico, Colombia.

LIBERIAN IRON-ORE PRODUCTION goal is 1-million tons annually—at a cost competitive with other sources. To bring this about, Export-Import Bank of Washington has made its first loan to Liberia—$4-million. Money will be used by the Liberia Mining Co. Ltd. to build a 45-mile railroad and to construct ore handling and storage facilities at Monrovia.

The government loan ties in with a $3-million investment program by Republic Steel Co., one of the leading U. S. steel producers, to develop ore production at Bomi Hills. Republic has a long-term ore purchase agreement for a portion of Liberia mining's output. Iron ore deposits at Bomi Hills are estimated at 20-million tons of 65% ore; large additional quantities of lower-grade ore.

INTERNATIONAL TRADE EXPERTS with the government have come up with estimates of how much East-West trading Europe will be doing in the fiscal

Washington Report (Continued)

year beginning July 1. Total both ways, they figure, will add up to $3.2-billion. That is one-third better than calendar 1948 but still 50% below pre-war.

Eastern Europe is expected to have the edge, selling $1.7-billion of goods to Marshall Plan countries. Chief commodities: lumber, potash, coal, non-ferrous metals. Marshall Plan nations are expected to sell $1.5-billion, mostly in machinery, textiles, consumer goods, and electrical equipment.

U. S. DECISION TO ABANDON REPARATIONS from Japan means the Japanese are to remain one of the world's potentially great industrial powers (see McG-H Digest, June, p21). Other nations on the Far Eastern Commission—notably China and the Philippine Republic—do not like the unilateral decision. But they can do nothing about it because the U. S. runs the occupation—and pays for it.

Result of the decision, however, in terms of industrial capacities is this: Japan is left with 6.4-million metric tons of crude steel, 3.6-million tons of pig iron, 4.8-million tons of sulphuric acid, 800,000 gross tons of shipbuilding, 110,000 metric tons of aluminum fabricating, 900 metric tons of synthetic rubber, 37,000 machine tools.

The Far Eastern Commission reparations program, now junked, would have taken away 45% of Japan's pig-iron capacity, 25% of its sulphuric acid, 80% of its shipbuilding, 73% of its machine tools, all its synthetic rubber.

JOINT ARGENTINE-U. S. COMMISSION has been set up to eliminate existing barriers to trading between the two nations. Commission's agenda: Study and make recommendations on paying off upward of $200-million backlog of debts owed to American exporters and on increasing shipment of machinery from the U. S. and of "non-competitive" Argentine products to the U. S.

Commission membership includes representatives of State and Commerce Departments, ECA, Argentine Embassy, and U. S. bankers and businessmen.

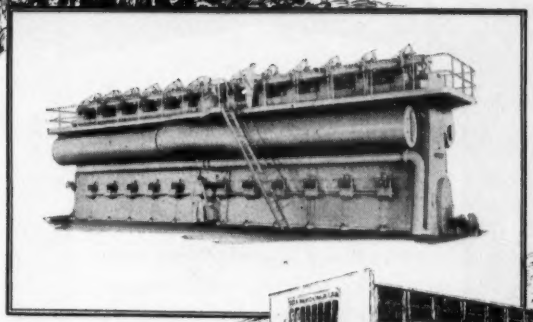
INTERNATIONAL GLIMPSES

U. S.-Czech negotiations over payment for nationalized American property have been recessed. At the final meeting, U. S. was asking for $40-million in payment of about 800 claims; Czechs were offering $23-million. The hard bargaining is yet to come.

U. S. has finished the job of selling its surplus war property overseas. The goods, which cost $10.3-billion, was liquidated at an average of 19 cents on the dollar. Sales included everything from raw materials and civilian goods to airplanes.

U. S. Congress will not approve the 55-nation UN International Trade Organization charter this year because of its full calendar headed by reciprocal trade and labor legislation and ratification of the North Atlantic treaty.

More Power to Mexico!



At the new Tacubaya generating station in Mexico City, Mexico, Nordberg has completed the largest Diesel Electric Utility Plant in the World.

Here six of the largest Diesel engines ever built in the western hemisphere have been installed by the Mexican de Luz Y Fuerza, S.A. and subsidiaries, in collaboration with the Comision Federal de Electricidad.

The six giant Nordberg Diesels (each of twelve-cylinder, 29 in. bore and 40 in. stroke) develop 51,900 h.p. at sea level and at the 7450 ft. elevation of Tacubaya develop 44,000 h.p. and deliver 30,000 k.w.

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July 1949 • McGraw-Hill DIGEST • Volume 4 Number 7

More Dollars Available Abroad

ECA, Greek-Turkish aid, military lend-lease, and record U. S. imports at $7.2-billion annual rate give foreign business needed dollars for purchases

NOT ONLY ARE the European Cooperation Administration, the Greek-Turkish aid, and military lend-lease programs putting dollars into the hands of the world's businessmen, but the United States is now importing goods from abroad at an increased rate. Importation, based on first-quarter figures for 1949, is at the rate of $7.2-billion annually.

The rehabilitation programs and increased imports by the U. S. are reflected in increasing exports from the U. S. to all parts of the world—Europe, Asia, Africa, and Latin America. At the close of the first-quarter 1949, U. S. exports were going at the rate of $13.1-billion (including re-exports) annually—4% ahead of last year. The real increase over last year may reach 10% when price drops are taken into account. Export total may reach $13.5-billion by the end of this year.

Decline in domestic prices may result in a holding off by foreign buyers of purchases of U. S. goods in the hope that prices will drop still further. If this should happen, there is no way of telling where the total year's figures might go. Chances are against a crack-up.

ECA spending, Greek-Turkish aid, civilian supply, military lend-lease, and Philippine rehabilitation programs may run 20% ahead of last year. Marshall Plan spending is sure to be double what it was in 1948.

Importation of foreign made goods into the U. S. may increase if foreign prices drop. This will be true especially in sterling areas. But talk of price decline is premature.

Analysis of first-quarter exports from the U. S. reflects the upturn of world-wide recovery. Relief shipments—especially foodstuffs—dominated the export picture through 1948. Today raw materials, semi-finished products, and some types of machinery are accented—all designed to expand industry and raise productivity abroad.

Direction of U.S. Exports

U. S. Exports To:	% of First Quarter Exports	% of 1948 Exports
Canada	14	15
Europe (Incl. U.K.)	37	35
ERP Countries ..	(36+)	(33+)
Eastern Europe .	(1—)	(1+)
Latin America.....	24	25
Asia	19	18
Africa	4	6
Australia & Oceania	2	1

Foreign countries are not buying all they might from the U. S. They are obviously maintaining or expanding their gold and dollar reserves for the first time since 1946. Canada, the United Kingdom, France, Colombia, and Norway are cases in point. Previously, foreign countries were liquidating their gold and dollar reserves, on balance, to buy in the U. S. market.

Now foreign buyers are not rushing in to buy whatever is available. With domestic pipelines filling or filled, foreign buyers are becoming more selective in their purchases. This shift of emphasis will give foreign customers a backlog of gold and dollars on which to rely in the event of serious drought, for instance.

Based on first-quarter figures for 1949,

Exports by Economic Classes

	1949 Annal Rate* (In Millions)	% Change From 1948
Crude Materials	$1,865.2	+25
Crude Foodstuffs	1,586.0	+26
Manufactured Foodstuffs	1,015.2	−22
Semi-Manufactures	1,536.8	+13
Finished Manufactures	6,924.4	−2
Total	12,946.6**	

** Based on first-quarter figures for 1949.*
*** Discrepancy between 1949 rate total by economic classes and $13.1-billion figure is caused by the inclusion of re-exports.*

the direction of U. S. exports has not shifted much from 1948. Canada remains the largest buyer, taking 14% of the total. Europe remains the largest single geographical-area buyer, taking 37%. All but 1% of these purchases are made by western European countries under Marshall Plan aid. Latin America's purchases are off only 1%, slipping from 25% to 24%.

U. S. government experts picture the 1949 export prospects, in major export commodities, as follows:

Cotton: Exports may run to 5-million bales, up 80% over last year. This large rise is expected chiefly from exports to Marshall Plan countries.

Tobacco: With Britain again in the market buying tobacco, exports should run 10–15% ahead of 1948. Total shipments may go as high as 427-million lb.

Coal: With European production rising rapidly, exports will fall off from 53-million to about 40-million tons.

Iron & Steel Mill Products: First-quarter exports were ahead of the 1948 average. World steel trade is fast becoming competitive. The total exports in this group, therefore, will probably level off by the end of the year to finish at about the same figure as last year.

Crude Oil: Middle-East production is slowly filling the gap in Europe's demand. Exports from the U. S. will run about 20% below 1948's 39.7-million barrels.

Rubber Manufactures: Foreign rebuilding of local rubber facilities progressed rapidly during the past year. Exports though will be about equal to the $125-million exported last year.

Motor Vehicles: Exchange restrictions are restricting sales more than ever before. Passenger-car exports are, for the period surveyed, 25% below last year; rate may drop even lower. Motor trucks and buses are moving faster than passenger cars. They are off only 12%.

Cotton Cloth: Increased production in France, Belgium, Italy, and the U. K. will cut into the 940-million sq. yd. exported last year.

Industrial Chemicals: Physical volume is holding up but prices have dropped. European chemicals have been rebuilt during the year. Expectations are for a 20% drop from 1948.

Grain: Wheat shipments are at an all-time high. The 1949 total will be ahead of last year's 328-million bushels. Corn exports were double the 1948 total.

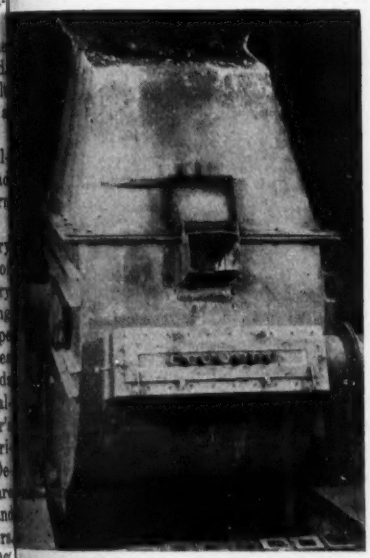
Machinery: As a group, machinery may dip 5% below the 1948 total of $2,255-million. Electrical machinery may be off as much as 15%. Rebuilding of manufacturing capacity in Europe has restricted imports in those countries to raw materials and semi-finished goods rather than finished products. Metal-working equipment will equal last year's $157-million. About $360-million in agricultural machinery will be shipped. Demand is still high and manufacturers are seeking sales. So are construction and conveying equipment manufacturers. Their business will increase about 10% from last year. Mining, well, and pumping equipment will be up about 18%.—Business Wk, May 21, p19

...akes High-Quality Steel

New process to make steel of openhearth quality combines the advantages of openhearth and acid bessemer processes; is still under development

...EL of openhearth quality, low in phos...orus and nitrogen, can be made rapidly ... a new process developed jointly by ...arnegie-Illinois Steel Corp. and Jones ... Laughlin Steel Corp. The low-phos...orus, low-nitrogen content is achieved ... turbulence produced by jets of air ...pinging on a bath of liquid pig iron. ... scrap is charged.

A 1,000-lb. basic-lined (magnesia) ex...rimental furnace, called a "turbo-...earth," was built with special facilities ...r making temperature measurements ...d taking samples. Trial heats estab...shed that substantially complete com-bustion of carbon inside the vessel would furnish ample heat to support the process and fuse the relatively large amounts of basic flux required.



TURBO-HEARTH furnace is basic lined, ...s 1,000-lb. capacity. Opening is for easy ...mpling. Below door is row of seven ob...rvation ports.

This complete combustion is where the new process differs with the basic bessemer. In the latter, combustion proceeds only to the CO stage, thus losing the heat of CO burning to CO_2.

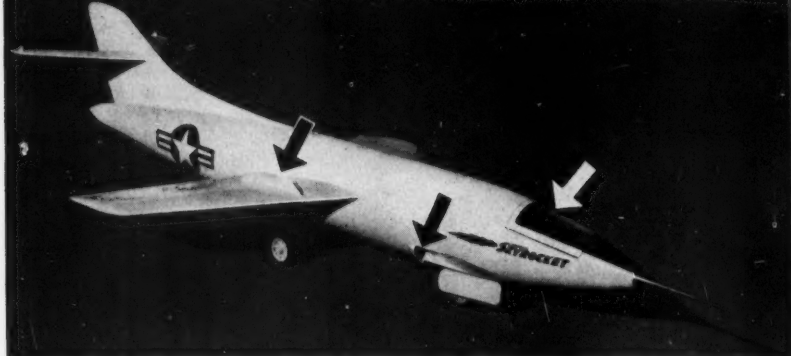
A 22-ton acid bessemer converter was then relined with a basic lining. The larger vessel performed metallurgically as expected, and low-phosphorus, low-nitrogen steels were produced from basic pig iron of average composition.

A typical charge contains about 4% C, 1.5% Mn, 1% Si, and 0.25% P. The finished steel would then have about 0.03% C, 0.10% Mn, 0.01% Si, and 0.017% P. Nitrogen remains the same

Operating troubles have not all been solved. Special burners, for instance, are required to avoid excessive cooling between heats because a basic lining, once heated, must be kept hot.

Another problem is the large quantities of flux needed—twice as much as in scrap-consuming processes. This causes a greater volume of slag, the composition and viscosity of which must be carefully controlled to prevent excessive losses by slopping. Separating slag and metal so additions can be made without reversion of phosphorus is not yet completely feasible.

Experience to date shows the turbo-hearth process combines the advantages of openhearth and bessemer and is fundamentally sound. Its use offers the chance to avoid the principal disadvantages of the openhearth process. It requires no outside fuel source and produces steel faster than does the openhearth.—Iron Age, Apr 21, p62; Steel, Apr 25, p98



ARROWS note wing fence to improve longitudinal characteristics before stall, flush air inlets, and heat-resistant canopy on the supersonic D-558-11

Report Reveals Sonic Data

National Advisory Committee for Aeronautics' report on sonic research gives a good picture of design details of planes 5-8 years hence

A FAIRLY ACCURATE picture of military aircraft of 1953 and commercial aircraft of 1958 can be drawn from data contained in the 34th annual report of the National Advisory Committee for Aeronautics, covering the committee's activities during the past year. Research results in the past have been accurate indexes to future design progress.

The committee feels that flights through the sonic barrier during the year may prove to be the most important aviation development since the Wright brothers' first man-carrying plane flight. Since the supersonic flights were made early in the period covered by the report, sonic research and development have been covered in detail.

Transonic problems have been relegated to three major divisions in the report: aerodynamics, power-plants, and construction.

Aerodynamics: Wings of planes designed to fly at transonic Mach numbers are characterized by thin airfoil sections plus low aspect ratio and considerable sweep. The maximum lift normally obtained by the wings is low. Maximum lift coefficients from 1:3 to 1:6, depending on angle of sweep, can be obtained with the best combinations of split flaps and leading-edge devices tested during the year. It was found that the importance of airfoil section decreases as sweep increases and as thickness of the airfoil decreases.

Leading-edge high-lift devices were shown to be effective in improving aerodynamic characteristics of the wings at takeoff and landing. Triangular wings combine structural efficiency of highly swept wings for flights at moderate supersonic speeds. No serious longitudinal stability problem would be encountered with wings of triangular platform aspect of 2.

Studies of boundary layer flow at transonic and low speeds indicated that a significant proportion of low-speed boundary layer theory was applicable to transonic flow.

Power plant: High-altitude tests proved at adverse effects of combustion effi-ency of low pressure and temperature re greater for low fuel-air ratios than approximately stoichiometric mix-res. Ramjet studies indicate that op-um performance over a wide range conditions required a variable ex-aust-nozzle outlet area. On a 20-in. amjet, performance was improved by ploying a nozzle plug.

Of particular significance was the dis-very that the thrust of a turbojet en-ne could be fully controlled by an inlet rottle or a variable exhaust nozzle or th with the engine operating at a con-ant speed.

A new type fuel system for gas tur-ine engines, comprised of a variable-rea atomizing nozzle and distribution ntrol, produces a fine spray over a ch wider range of fuel-flow rates than ed-area nozzles.

One type of hydrocarbon fuel gave a mbustion efficiency much greater than her hydrocarbon fuels.

Construction: Stress phenomena of ept wings were found to be restricted the position nearest the fuselage, reases in the outer wing area being irly close to stresses for straight wings. ckling of stressed skin of wings under ar loads resulted in a reduced tor-nal stiffness and reduced aerodynamic irness.

A structural evaluation made of an extruded magnesium panel showed it to have structural characteristics lying midway between 24ST and 75ST aluminum panels fabricated in the usual manner.—Aviation Wk, May 9, p21

Machine Dips and Spins Engine Core Assemblies

Ford Motor Co. Rouge foundry has made major changes in coremaking practices. The purpose was to get cleaner engine castings and to eliminate metal flash in port openings and water passages.

The most unusual piece of new equipment is an automatic dipping and spinning machine. Essentially it is a conveyor loop carrying 14 fixtures on each of which two complete core assemblies are loaded and locked in position.

Conveyor chains carry the fixtures over an end sprocket and back over a large refractory dip tank underneath. The tank, by a system of arms and cams, is raised to submerge the cores, moved along with the fixture, lowered, and retracted.

As cores emerge from the liquid, a worm shaft engages a pinion on the fixture and rotates it at 90 rpm. for 9 sec. to throw off excess wash. Fixtures are then carried up over the second end pulley and placed on another conveyor leading to bake ovens. Capacity is 550 cores per hr.—Foundry, May, p108

If Costs Are Important To You . . .

In this issue is the first of three reports to management that will treat just one subject —HOW TO CUT COSTS. On p61, Cutting Production Costs Keeps You Ahead of Your Competition brings you the latest thinking on how a cost-reduction organization should be set up and how it should operate.

In the September issue, the second report to management will concentrate on designing for lower cost. It will show you how the design engineer may well be considered the keystone in any cost-cutting program—and how he can do that job better.

In January of next year, the third report (a 24-page reader bonus) will cover industry —construction, manufacturing, mining, processing, and all the other jobs that go to make up industry. And from month to month, the McGraw-Hill Digest will carry, in addition to these management reports, supplemental articles, each one treating a different aspect of "How To Cut Costs."

New Flour Mill Features Ultramodern Operations

Advanced design and equipment are embodied in General Mills, Inc.'s new flour mill in Los Angeles. The elevator is unique in that an exposed roof steel storage and headhouse bins have replaced conventional concrete structures.

The bin top floors are "open air." The enclosed weatherproof distribution conveyors above storage and headhouse bins are out in the open. Another innovation is inert gas blanketing of bins to make the elevator dust- and explosion-proof.

The smut-house is a three-story, roof-floor building adjacent to the elevator. New features here include electrical interlocks for equipment and bin-eye controls. Application of heat, steam, water, and gas is controlled by instruments. Solids are reclaimed from chlorinated water used in the wheat washer by a flotation-clarification process.

The mill building is distinguished by extensive instrumentation and by pneumatic handling of mill separates, thereby eliminating the conventional bucket elevators and screw conveyors. In this building, as in all others, operations have been mechanized to the fullest extent.—Food Ind, May, p72

Bascule Span Raised 7½ Ft.

A 6,000-ton, 320-ft. span, double-leaf bascule bridge, connecting Long Beach and Los Angeles, Calif., was raised 7½ ft. in 5 working days to correct for a 5½-ft. subsidence since the bridge was constructed in 1924. New fill for land approaches was placed, new bents placed atop old bent and approach span, deck jacked up and replaced on new bents.

Structural elements of the span were reinforced before raising began. Twenty-four specially-designed hydraulic jacks were used to raise bridge, each jack tested for 370-ton load. Jacks were powered by positive-displacement piston pumps. Tolerance was ¼ in. After each ¼-in. rise, shims were inserted. After each 6-in. rise, a grillage of I-beams was placed under each column base plate. After each 2½-ft. rise, grillages were encased in concrete. The concrete-encased I-beam grillages were left in place for possible future raising.—Eng News-Rec, Apr 21, p18

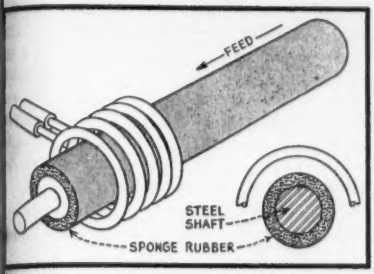
"Why I Like My Job" Contest Shows What Workers Dislike

General Motors Corp. received 175,000 letters totaling 1,250,000 reasons why employees liked their jobs. The company officials turned the tables and, by noting facts not mentioned or rarely mentioned, found out what workers did not like. As an example, if only 10% of the persons from Dept. A liked the lighting, as against 15% favorable reaction company-wide, Dept. A's lighting must not be good.

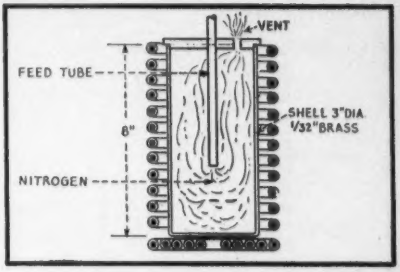
Reasons were coded and placed on IBM cards along with such employee data as sex, age, job, seniority. This permits closer study of favorable (and unfavorable) comments. "Liking the boss" was mentioned most frequently, followed by worker's associates, wages, character of work, and pride in company. At the bottom of the list were success achieved by employee, parties and open houses sponsored by company, and pride in building a good product.—Business Wk, Apr 30, p110

Road Heating Effective

Detroit experimented this last winter with radiant heating to keep two sections of highway free of ice and snow. Tests were considered satisfactory. A 4-in. snowfall, for example, was disposed of with power consumption of 40 kw.-hr. per 500 ft. of section. Maximum demand was 175 kw. for the total surface of 3,000 sq. ft. protected by the radiant system. —Elec World, May 7, p67

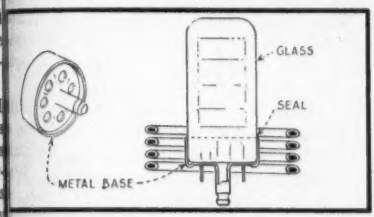


REMOVING RUBBER coating from steel printing rolls is done by feeding through a multi-turn induction coil at 24 ipm. Heating to 500° F. breaks the bond so the sleeve can be stripped off by hand.

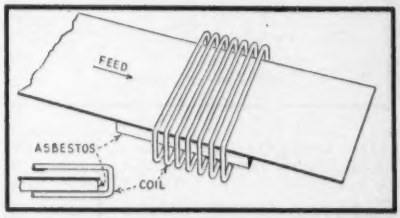


TINNING SHELL inside calls for 40-sec. heating to 600° F. with combination pancake-cylindrical coil. Nitrogen fed in by ¼-in. tube prevents oxidation and porosity. Gas escapes through ½-in. vent hole.

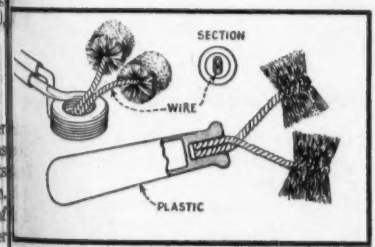
Induction Works at Odd Jobs



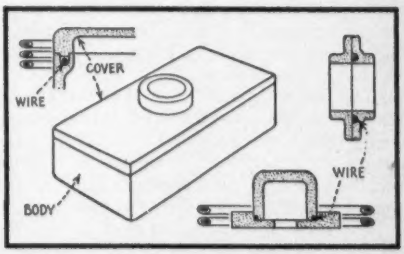
RADIO-TUBE bases are salvaged by rapid heating to 500° F. in 1 sec. to expand metal base so it breaks away from the bonded joint before heat is conducted to the glass envelope.



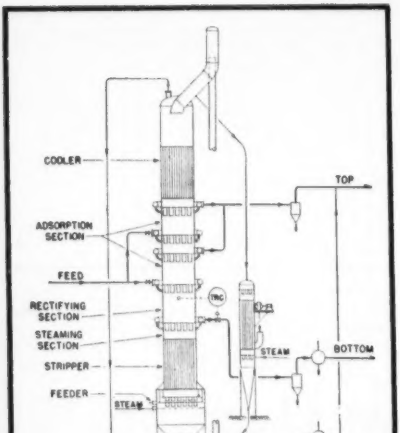
STEEL SHEETS coated with lacquer or lithographic ink are fed through induction coil at 10 ips. and heated to 275° F. for drying. Sheet rides on asbestos or transite plate within the coil to stay at coil center.



DOUBLE BRUSHES are assembled by spot-welding twisted wires together and coil heating them to 800° F. in 1 sec. Heated ends are hand-pressed in a slightly undersized hole in plastic handle.



BONDING PLASTICS with wire reinforcements is quickly done. Box cover is bonded in 3 sec. Joint at lower right is made with preformed ring. At upper right, wire is heated element.—Am Mach, Apr 21, p81



HYPERSORPTION unit with multiple feed trays (Union Oil Co.) resembles a fractionating column and is used to . . .

Recover Light Gases from Gas Streams by Absorption

The Hypersorption process, now in commercial use in two installations, separates and recovers light gases in petroleum refining. A moving bed of activated carbon absorbs hydrocarbons out of lean gas streams.

The unit resembles a fractionating tower. When lean gas is processed, multiple feed trays are employed. Such applications include processing of lean natural gas, propane recovery, and ethylene recovery from coke-oven gas.

The separation of gases over activated carbon involves countercurrent contacting in two phases and is analogous to conventional multicomponent fractionation. Important in operation are the factors of reflux ratio, stage number, variable molal flow of phases, and adsorption effects of carbon.

A recent development in Hypersorption processing for recovery of propane, ethane, and ethylene from refinery gas is replacement of the usual low-temperature fractionator by a second Hypersorption unit. This permits recovery of ethylene of high purity and also recovery of hydrogen produced in ethane cracking at over 99% purity as a fourth product.—Oil & Gas J, Apr 28, p95

Close-Tolerance Molding

All-plastic harmonicas are manufactured by Magnus Harmonica Corp. by polystyrene injection molding. Most critical part is the reed plate, a narrow strip having a series of rectangular holes over which reeds project.

Each reed, free to vibrate, is of different length and thickness from the rest, and must vibrate at a certain rate to produce the correct musical tone. Higher-note reeds taper to about 0.012 in.

Reeds are tuned in the molding die itself. When a new die is made, it must be brought to exact size by molding a set of plates, subjecting reeds to critical tests, and correcting the die cavities as required. It takes 6 months to build a set of dies with cavities for six pairs of plates.

No flash is tolerated on any part. As each red plate is removed from its casting gate, it is checked for thickness to 0.0001 in.—Am Mach, May 5, p114

Steel Tower-Wood Pole Cost

Bonneville Power Administration has designed a light steel tower for use on 230-kv. lines in place of wood poles. The tower is designed for the usual transverse loads and a longitudinal load of 3,000 lb. and is suitable for areas not subject to severe icing. Economy studies have shown its annual cost to be 10% less than wood pole construction. — Elec World, Apr 23, p86

Special Properties Affect Metallized-Structure Design

Sprayed metals, applied by metallizing, have specialized properties that must be considered in product design. Tensile strengths of sprayed metals are reduced because of their peculiar structure. This prohibits metallizing for bearing races and similar surfaces.

But shrinkage of sprayed metals is usually more important than tensile strength. High-shrinkage metals when applied in heavy coating, over 0.060 in., tend to crack. Some steels, such as high-carbon and high-chrome, medium-carbon steels, have low shrinkage.

No specific figures are available on compressive strengths, but tests show a minor reduction. Impact strength is low, all sprayed coatings being brittle. Therefore, they should never be applied to valve seats, cam surfaces, dies and punches.

As sprayed coatings are somewhat porous, they can hold oil and operate with considerably less friction than ordinary metals. Wear resistance is good. Corrosion resistance is satisfactory if the sprayed metal is anodic to the base. This means aluminum or zinc for steel products.

Special adaptations made by ingenious designers include metallized (zinc) speed nuts, melting crucibles, annealing covers. When metal parts are to be joined to porcelain products, copper can be sprayed on and metal parts soldered easily. Another special is metallized aluminum coatings on cloth for radio capacitors.—Prod Eng, May, p117

Tetrafluoroethylene Packing

Packing of tetrafluoroethylene (Teflon) for valves, rotary shafts, reciprocating rods, in spools and rings has been developed by Crane Packing Co. Known as "Chemlon" packings, they are available in two types of round cross-section braided spool-form from 1/8-1 in. dia. It is unaffected by acids and caustics up to 300° F. In ring form, packing will withstand acids and caustic exposure to 690° F. Rings are graphite-lubricated or dry.—Mod Plastics, May, p130

Makes Driver Training Safer

A garage foreman at San Francisco Municipal Railways has invented a push-button brake control to permit instructor to brake bus in case of danger. Push-button is attached to an interlocking circuit by cord. Pressure on button releases accelerator pedal and applies brakes at half pressure. Button also permits instructor to slow bus down so student will learn when to shift gears.—Bus Trans, May, p77

INFRARED DRIES MOLDS

Precision-casting molds for gas-turbine blades and other intricate castings at Westinghouse Electric Corp. are dried in this 248-lamp infrared oven. Lamps, which melt out 98% of wax, replaced steam tables, low-temperature ovens, and hot plates formerly employed. Mold cracking and casting rejects have been reduced. Wax residue is burned out in preheat oven.—Elec C&M, May, p98

How To Machine Worn Parts Built up by Electroplating

Machining of parts built up by electrodeposition has an important effect on their usefulness. Both soft and hard nickel deposits are machinable, but certain precautions should be observed.

Nickel work-hardens readily and so requires definite cutting rather than scraping. For best results, high-speed-steel tools are recommended with 15° or more top rake and up to 5° front clearance. Tools must be sharp. Thin chrome plating of 0.0001-in. thickness helps prevent build up on the tip.

In turning, slow speeds and heavy feeds are advised and the tool should not be set below center. The deposit should be machined from its center out, not from the edge inward.

Milling-cutter teeth should be backed off to 10–15° if possible, and cutting speed should not exceed 400 sfpm.

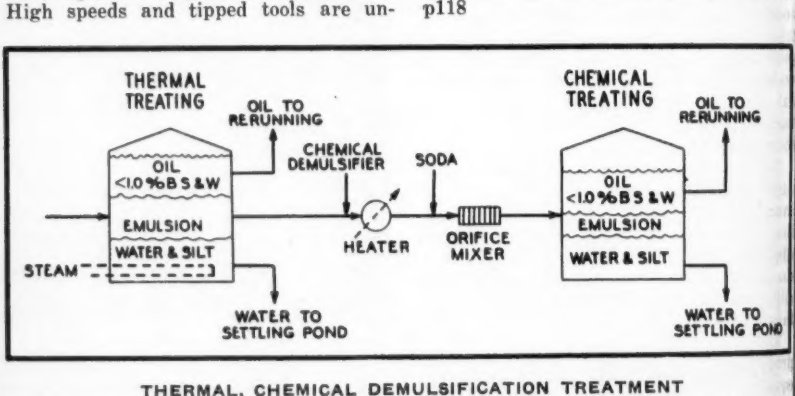
Boring is best done with a large-diameter, rigid bar supported at both ends. High speeds and tipped tools are unsatisfactory. Drilling and reaming require sharp cutting edges, increased rake and clearance angles, and smooth chip-deflecting surfaces.

Tapping is difficult. Suggestions: slightly larger hole, well backed-off tap, plenty of lubricant, frequent reversal. Grinding is not troublesome; it requires an open-textured wheel. Chromium deposits can only be ground.—Mach, Apr 16, p1679

Stringing Sled Saves Time

A specially designed running board, or stringing sled, reduces physical effort of linesmen during wire-stringing operations at California Electric Power Co. It reduces stringing time by 50%.

The sled is made of heavy-gage sheet metal and a single pulling bar. It has a blunt-pointed end that curves up to give a sledding effect and to lift conductors over crossarms. Pulling line and the three conductors it strings are attached to the bar by swivel eyes with standard clevises.—Elec World, Mar 26, p118



THERMAL, CHEMICAL DEMULSIFICATION TREATMENT

Combination thermal and chemical demulsification units helped solve stream-pollution problem for Esso Standard Oil Co. All tank-bottom emulsion is pumped into thermal treating tank, heated, and allowed to settle for 24-48 hr. Clean oil is pumped off. Chemical demulsifier and soda are added to emulsion remaining. Emulsion is mixed in seven-plate orifice mixer, passed to chemical setting tank (24-48 hr.). Interfacial emulsion is left in tank, while clean oil is drawn off to storage. Demulsification improves efficiency of plant's separators.—Oil & Gas J, Apr 21, p181

BOXES TUBES

...is General Electric ...be cartoner feeds ...t folding cartons ...m magazine, makes ... carton, inserts ...e, and closes top ...d bottom tuck-in ...pe. It imprints tube-...pe designation on ...e panel of carton. ...te of automatic op-...tion is 160 per min. ... Electronics, May, ...22

Controlled Tests Evaluate Soft-Solder Efficiency

Careful tests made by Kester Solder Co. under controlled conditions revealed interesting data on solder efficiency. Experimental procedure was to solder an inverted U-shaped nickel-silver strip to a flat brass sheet and to determine the force needed to pull the strip from the sheet.

Test results showed that when tin is added to lead, alloy efficiency increases sharply, reaching a peak at about 15% tin. More tin causes a sharp fall in efficiency to a low at 20% tin. As more tin is added, efficiency increases gradually to a second peak at 60% tin, then falls off.

Addition of a small amount of silver produces about the same effect as an equal amount of tin. Contrary to popular belief, a small amount of silver is not equivalent to a large amount of tin.

Antimony imparts no useful quality to solder. Compound-stress and multiple-stress values indicate that it makes solder less resistant to strain.

Cadmium also fails to improve solder efficiency. While it may serve as a partial substitute for lead, cadmium alloys oxidize easily and tend to form brittle, porous, and uncertain joints.

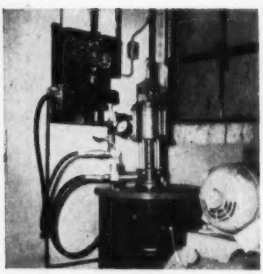
Bismuth should be excluded from soft solders because of brittle joints.—Am Mach, May 5, p110

Glutamate from Corn Protein

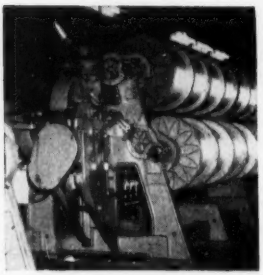
Monosodium glutamate is now being made from vegetable proteins left from normal corn-refining operations. Digestion is accomplished under reflux in 15-20 hr.

Resultant hydrolysate is diluted, neutralized with Na_2CO_3 or NaOH, filtered, and washed. The filtrate contains the desired glutamic acid, as well as a mixture of amino acids. It is concentrated to precipitrate out chloride, several amino acids, and inorganic salts.

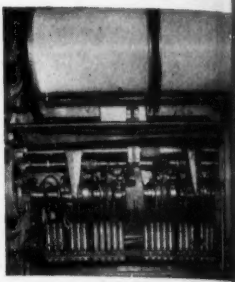
Resulting is a filtrate that is cooled and adjusted as to pH to separate the mother liquor. Crude glutamatic acid is recovered by centrifuging, purified, and further treated to form the monosodium salt.—Food Ind, May, p86, 124



FROM remote pump . . .



. . . through feed lines . . .



. . . to tricot machine

Centralized Lubrication Pays

Large numbers of textile machines are being lubricated from a central point with system. Ko-Nit Textile Co. finds production up and power costs down

CENTRALIZED LUBRICATION of textile machinery—or any machinery to which one of the various systems may be applied—is not to be confused with centralized maintenance. The latter refers to the placing of responsibility for plant maintenance, including lubrication, into the hands of one department. The former refers to the lubrication of large numbers of bearings or other mechanical parts periodically from a central reservoir at one time.

Reservoir and pump may be mounted remotely or on the individual machine. Lubricant is pumped under pressure from the reservoir through tubing to metering units, either on or near points to be lubricated.

Mill engineers in plants that have installed one of the five available systems for textile equipment report savings in oil up to 50% over manual-oiling methods. No oil goes onto the floor, cloth, or machine. Labor savings are great.

Since many parts can be lubricated while machine is running, a saving of productive time can be realized. On a spinning frame, top rolls and spindles must be oiled in addition to head-end. But if head-end bearings are centrally lubricated, over-all lubrication time can be reduced considerably.

Use of oil is improved by the systems. The necessary amount is applied; the human error of too much or too little is eliminated. As the system is fully enclosed, possibility of lint or fly entering bearings is eliminated. Applied while machine is running, proper distribution is guaranteed instead of the lubricant merely running to the low side.

Mechanical questions of paramount importance to mill men are line breakage and system plugging. The lines can and do break, usually because of faulty installation. They occur also as a result of too much vibration. Most frequently broken lines connect two parts vibrating in different frequency and amplitude. Sufficient slack must be given and clips should be used frequently.

Cases of plugging are rare. Systems operate under fairly high pressures which tend to discourage plugging, but even higher pressures are possible to unplug stoppages. Plugging can be prevented by using clean oil directly from the barrel. It is almost impossible for foreign particles to enter the system.

Ko-Nit Textile Corp. installed a cen-

ralized lubrication system on 10 of its ricot-knitting machines. System and installation cost $750 per machine. The ompany feels that the system has already paid for itself. Production has umped 22% since installation, power osts have dropped 20%.—Textile World, May, p115

Textile Machines Flexible

New 2- and 3-roll padders, developed by H. W. Butterworth & Sons Co., permit more flexibility and interchangeability in finishing operations. A 4-ton "Bullet" padder can be converted to a 15-ton padder without loss of operational time. Rolls from 12- and 20-in. dia. can be used. They can operate from 0-15 tons pressure.

Major parts of a new horizontal rope saturator and rope squeezer, also made by Butterworth & Sons, are interchangeable. Higher speeds, better breaching, and better handling are claimed. In production tests, labor costs were reduced 40% and floor space 25% by use of these units. Speeds up to 300 yd. per min. are possible in bleaching operations.—Textile World, May, p146, p148

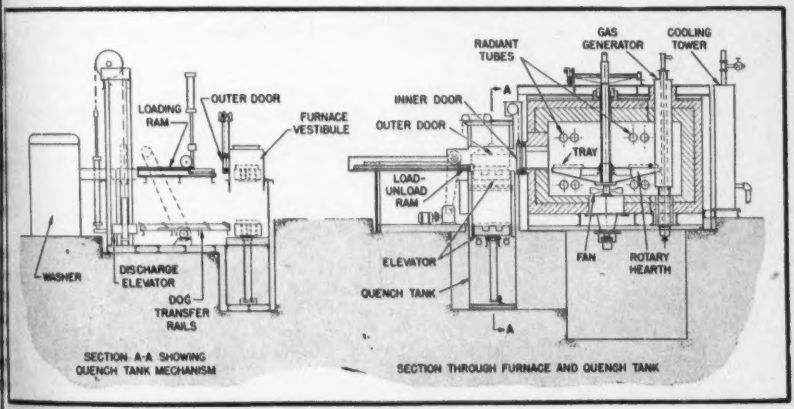
Rotary Furnace Features Automatic Work Handling

Compactness and flexibility are claimed for the rotary furnace shown below. Designed for use where work volume is less than would require a pusher or conveyor furnace, the rotary furnace is suitable for carbonitriding, clean hardening, and deep-case carburizing of small and medium-sized parts in tray loads.

The unit, made by Holcroft & Co., has a built-in catalytic gas generator. Gas is passed from radiant burner to a cooling tower to reduce moisture content and then back through the catalyst in the generator to give it a content of 16% C, 20% H_2, and balance N.

Operation of the furnace can be automatic or batch. With automatic, the operator merely places the work in front of door and presses "load" button.

Work is fed in by ram, the hearth indexes one position, and the ram moves the tray of work then beneath it to the vestibule elevator for quenching. Dog transfer rails move quenched work to discharge elevator for transfer to the washer.—Steel, May 2, p87



CONTROLLED-ATMOSPHERE rotary heat-treat furnace is heated by gas-fired or electrically heated radiant tubes. Work is automatically charged, quenched, and discharged.

Wood Flooring Developed for Radiant-Heat Installations

A new type of wood flooring has been developed by Higgins, Inc. for use with radiant heat. It is a five-ply hardwood bonded with water-proof glue that has been impregnated with chemicals to resist moisture, termites, and other vermin.

The flooring, 9-in. square blocks ⅜ in. thick, has ⅛-in. deep grooves 2 in. apart on the under side. When the flooring is laid in mastic that has been applied directly over the concrete slab, the mastic is forced into the grooves to increase the holding strength.

A typical residence installation has an 85,000-Btu. Bell & Gossett unit. Radiant copper tubing is laid in a 4½-in. concrete slab block placed over a 4-in. fill of sand. Foundations and footings extend 4 ft. below grade, and the outside edges of foundations below grade are insulated with a waterproof material.—Am Builder, May, p106

AIR STAND CUTS DRILL TIME

One man can drill an 8-ft. hole in sandstone in 15 min. with this jackhammer stand built in the shops of Diamond Coal Mining Co. Previously it took two men 45 min. to drill the same hole. Stand (above) is in working position without jackhammer. Tube is 1¼-in. pipe telescoping into a 3-in. thin-walled steel tube. Compressed air gives required pressure against jackhammer. Forked end prevents turning.—Coal Age, May, p112

Switch Protects Transformer

A high-voltage interrupting device for high-side protection of step-down power transformer banks has long been needed. Portland General Electric Co. has just installed one that should give better protection than fuses and be more economical than an oil circuit breaker.

Made by Schwager-Wood Corp., the switch is basically an air break switch. Mounted on the hinge end is a small interrupting chamber containing an oil-blast-type interrupter.

The interrupting device is in series with an air break switch. When the switch opens, the device interrupts the current prior to separation of the air break contacts. Interrupting capacity of the device is 250,000 kva.—Elec West, Apr, p71

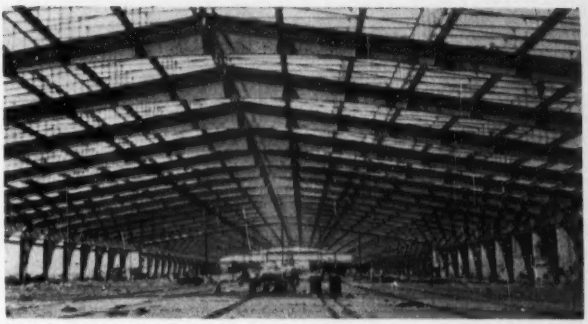
Allyl Starch—New Resin

General Mills Research Labs is now producing allyl starch, a new resin, in pilot plant batches. It is an unsaturated starch containing 1.7 allyl groups per glucose unit. The cream-colored solid is soluble in alcohols, ketones, esters, halogenated hydrocarbons, high-flash naphthas, and ethers. When cured it forms a hard finish, resistant to marring, water, and acids.

Because of these qualities it has been used in paper and wood coatings, printing inks, varnishes, overprint varnishes, and rubber preparations. In printing inks, particularly aniline inks, it is used as the ink vehicle. Inks dry more quickly than standard inks.—Mod Packaging, May, p131

BIG BUILDING

World's largest clear-span transit shed, at Long Beach, Calif., has 200-ft. span, is 1,152-ft. long. Rib frames were shop-fabricated in five sections and welded at site with 70% welding done on the ground. Raised by cranes, ribs were finish-welded in place.—Weld Eng, May, p28



Cost of Poor-Quality Goods Runs to $2-Million Annually

Textile-mill operators estimated their costs resulting from poor-quality cloth at $500,000 annually. A survey proved the cost to be in excess of $2,000,000. An adequate quality-control system could reduce this figure markedly and should cost no more to operate than 3–5% of total quality loss.

Methods and procedures to establish a textile quality-control program can be reduced to a 5-point plan.

1. All cloth defects can be identified and determined as to source, cause, and responsibility. Once detected, cause can be traced easily.

2. Defect forms and a record board simplify recording by inspectors of the thousands of defects daily. Defects should be recorded by loom-set by shift. About 50% of all types of defects account for 97% of all seconds.

3. An actual quality-loss value must be determined for each defect. Revenue loss because of sale of seconds, allowances given, and other causes are allocated to various defects according to the seriousness of the defect.

4. Defect forms and seconds' reports for cloth rooms should be tabulated on business-machine cards.

5. Tabulating department will be in a position to prepare automatically, then, various quality-control reports desired by management from the punched cards.

Five types of reports must be kept—departmental quality-loss report, operator's quality-loss report, loom-set quality report, seconds' report by loom-set, and fabric report.

As the quality-control plan succeeds, cost of operation decreases proportionally.—Textile World, May, p103

Electronics in the News

Use of magnetic tape in telemetering and similar applications is increasing. Programming of industrial operations with magnetic tape is next. One manufacturer is experimenting with tape as a means of automatically cycling a lathe through a series of operations.

A proposed radar screen in Europe would stretch 1,500 mi. from Lubeck on the Baltic to southern Tunisia. This would give a half-hour's warning of any air assault. Italy, Denmark, Norway, and Western Germany may be included.

Special industrial problems are being welcomed at the U. S. Navy Ordnance Laboratory, the most complete non-destructive testing layout in the world. Among the equipment are a 10,000,000-volt mobile betatron, a 2,000,000-volt mobile X-ray machine, a 400,000-volt machine, a 250,000-volt crane-and-truck mounted machine, and a 160,000-volt fluoroscope.—Electronics, May, p60, 154

Technical Shorts

Modifies Magnesium Treatment—A surface treatment that compares favorably with standard chromate and selenium coatings is 5-min. immersion in hot aqueous solution of 7½% sodium dichromate plus 3% selenium dioxide. Developed in England, it avoids main disadvantages of selenious acid treatments.—Iron Age, Apr 28, p77

Moveable Hanging Scaffold—Mounted on rugged casters and heavily counterweighted, a moveable cantilevered I-beam scaffold was used by Pozzo Construction Co. on a cornice-removal job. I-beams were held in position by a framework of regular tubular scaffolding elements.—Eng News-Rec, Apr 14, p78

Jet Lands Sans Gear on Carrier—A British Navy *Vampire* has completed successfully belly-landings on a carrier deck. Deck is steel with a rubber surface. Elimination of landing gear adds considerably to plane's range. Plane is launched by catapult.—Aviation Wk, Apr 25, p15

Aids Geography Study—A new series of geographical classroom maps, made of Bakelite phenolic resin, are protected by a melamine impregnated surface sheet. Cover-sheet permits teacher to mark surface with a pencil and then wipe off markings with a rag.—Mod Plastics, May, p79

Processes Citrus Molasses — Byproduct of juice canning, citrus molasses is now processed by submerged combustion. This consists of heating or evaporation by use of an open submerged flame, transferring heat by hot gases. Pulp press liquor is concentrated in this way into the citrus molasses.—Food Ind, May, p152

New Drafting Guide Improves Roving—Improved roving uniformity and better proportionment of drafts on rear and front drafting zones of long-draft roving frames have resulted from a new guide developed by the Dept. of Agriculture. Variation in cotton yarn has been cut 50% in strength and 40% in yarn number.—Textile World, May, p131

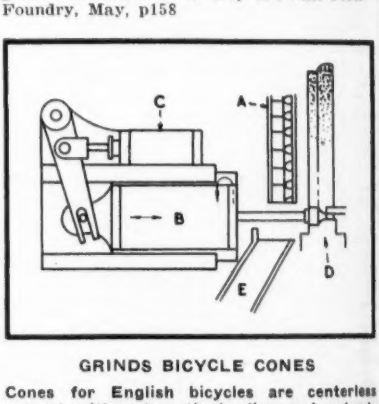
Check Ball Mill Feed Stoppage—Three electric clocks on the wall of the Wright-Hargreaves ball mill are connected to pivot shoes riding on feed entering the plant's three ball mills. If feed stops, shoe drops down and closes an electrical circuit. Clock (all set at 12 o'clock) starts and continues until belt resumes feeding. It is then a simple matter to multiply average belt capacity by number of minutes belt was down to find amount of feed lost.—Eng & Min J, May, p112

Eases Materials Handling—Waterman Steamship Co. is using Dravo Corp.'s "Transportainers" in handling special cargo. They ease materials handling, insure against damage and pilferage of cargo. The 275-cu. ft. steel containers are waterproof. In container, many small pieces of freight can be handled as a single piece.—Marine Eng & Ship R, May, p63

Does Not Corrode—Tests by Remington Arms Co., Inc., on titanium show it to be practically unaffected by exposure to sea water or marine atmosphere. Wet chlorine gas, hot chromic acid, and hot ferric chloride solutions also are not corrosive to the metal.—Steel, May 2, p81

Wood Pulping—Reported from Germany is use of peracetic acid at 70°C. for 4 hr. in pulping spruce wood. Yield in one case was 56.6% pulp containing 80.1% alpha cellulose, 19.2% hemicelluloses, and 0.1% lignin.—Paper Ind & World, Apr, p104

Easy Scrap Identification—Gates and risers in foundries can be segregated easily by using nails of same material with numbers on the heads corresponding to alloy designation. The nails are pushed into tops of gates and risers while they are still soft.—Foundry, May, p158



GRINDS BICYCLE CONES

Cones for English bicycles are centerless ground with automatic loading and unloading. Held in loading chute A, cones are picked up by workholder B, which is operated by hydraulic cylinder C, and advanced to workplate D. Wheels close in to plunge-grind the work. Finished piece is knocked off workholder and drops down chute E.—Mach, Apr 23, p1719

Strip-haulage Costs—Changing from dump trucks to tractor-drawn semi-trailers for haulage at Rimersburg Coal Co. has cut 20-25% off haulage costs from strip mine to tipple. At tipple, an electric crane is employed to dump the trailers, thus saving both dead weight and initial cost of transportation.—Coal Age, May, p102

For Safety Sake—A U. S. manufacturer of automobile floor mats irons the holding compound into the felted jute. The ironer roll, 16 in. in dia. and 92 in. long, had to be held at 450° F. Open-flame heating was ruled out because of lint floating in the air. Electric heat was applied by clamping 51 heating units 96 in. long inside the roll. Total demand is 59.5 kw.—Elec World, May 7, p108

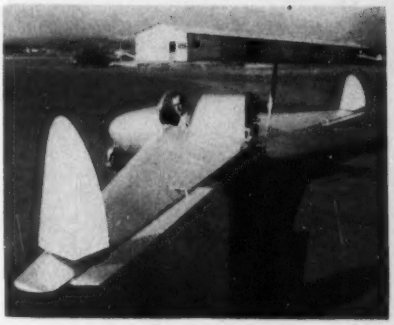
Marks Jungle Control Position—Aluminum foil has been found to be effective marker for ground-control points in surveying. Low-flying planes drop 325-ft. rolls of foil which drape over foliage. Strips are easily spotted by ground crews. Once control stations are established they are marked by large aluminum-foil crosses.—Eng News-Rec, May 12, p71

Perlite Costs Should Drop—With discovery of nearly pure perlite deposits in the southwest U. S., Great Lakes Carbon Co. will expand its production of the lightweight building material. Cost of removing impurities has kept perlite expensive. Pound for pound, perlite plaster gives 2.7 times the area given by standard sand plaster.—Business Wk, Apr 30, p50

Simplifies Valve Design—A coined nickel disk acts as valve seat, safety disk, and washer between body and cylinder of a new fire-extinguisher valve. It also replaces two parts and a machined section in the old valve. It can be replaced easily when excess gas pressure ruptures it.—Prod Eng, May, p100

Roofing Paper Contraction Joints—California road contractors have substituted asphaltic roofing paper for wooden planks in concrete highway joints. Strips are pressed into freshly laid concrete just under the surface. As concrete cures, dummy crack is formed, leaving surface smooth.—Cons Meth, May, p128

Stretches Crane—Overhead crane at Lehigh Structural Steel Co. was modified to handle a lifting job out of its travel range. An I-beam was suspended horizontally from the crane trolley with one end extending over the work to be lifted. Its other end was weighted to counterbalance weight of the work and keep the beam horizontal as the work was lifted.—Power, May, p85



MIDGET FLYING WING

Designed and built by Robert Sebring, this swept-back midget flying wing has passed taxi tests and, after modifications, will be test-flown. It is constructed of plastic bonded plywood. Plane will use a 25-hp. engine in flight tests. Wing span is to be increased to 31 ft.; tricycle landing gear is to be replaced with tandem gear. Wing chord is 42 in. at center, 9 in. at tips.—Aviation Wk, Apr 25, p43

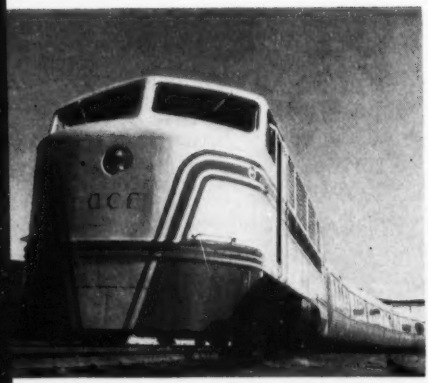
Studies Metal Insides—Dr. Carl Zapffe has developed a new microscope technique to study properties of tungsten. Called "fractography," it magnifies inside of metal grains several thousand times so conclusions can be drawn regarding atomic structure as it relates to fracture.—Am Mach, Apr 21, p133

High-speed X-ray—Westinghouse Research Laboratories have developed equipment to make X-ray exposures of 10 microseconds on 9.4-in. wide film moving at 150 frames per sec. Use is to study the burning of rocket fuels and similar actions by the slow motion obtained on projection.—Electronics, May, p183

Settles Gold Mine Dust—When wind blew dust from its 100-acre nine-tailings pile into nearby Colorado Springs, Golden Cycle Corp. surrounded the top of the pile with a sprinkler system. Now when winds rise, system is turned on and the spray settles the dust.—Business Wk, Apr 2, p30

Low-cost Housing Trick—A New York housing project is installing plumbing facilities by bolting them to threaded female studs. Studs are gun-welded to metal anchor plates secured to wall studs with U-bolts. Each bathroom plate has seven welded studs—four for toilet bowl, three for wash basin.—Weld Eng, Apr, p82

Coming, . . .



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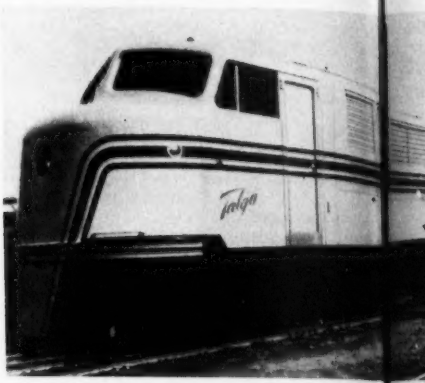


Talgo Coaches Present a New Idea

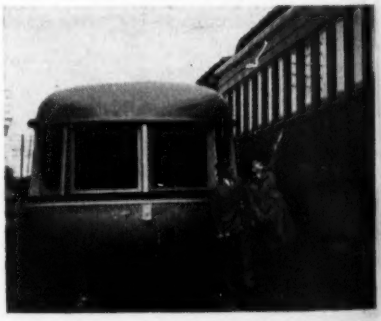
Train built for service between Madrid and French border. Coaches seat 16 passengers per unit, with four units and designs. Coaches seat 16 passengers per unit, with four

UNUSUAL DESIGN is featured in American Car & Foundry Co.'s Talgo train, designed for use on the run from Madrid to the French border. Three such trains will be constructed. Consisting of an ACF-built locomotive, one baggage unit, and one 5-car coach unit, the train is a radical departure from standard U. S. train design.

Car design is unique. Coach unit consists of four passenger-carrying cars and an equipment car. Each unit is carried on only a single pair a wheels, instead of the standard two-truck wheel assemblies. Front end is supported on a special coupling on the rear of the preceding unit. Baggage unit is suspended from the locomotive on a trapezoidal linkage. Locomotive trucks are standard.

Sixteen passengers are seated in each passenger-carrying unit. In service in Spain, the train will seat 176 passengers, plus 16 persons in an observation-lounge car. Coach is 101 ft. long and 9 ft. 7 in. high (about 4 ft. less than standard U. S. coaches). Floor is 2¾ ft. lower than standard. Outside width is 10 ft. 7½ in. A complete unit weighs 37,400 lb.

The framing is made of aluminum alloys. The U-shaped center sill is an extrusion; cross bearers, floor beams, and floor stringers are Z-sections. An Alclad



Comparison of standard and Talgo trains

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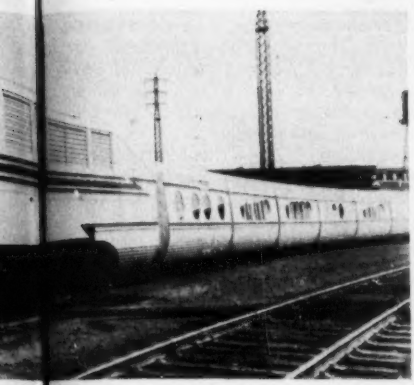


lden Train Design

rench has a radical departure from standard U. S. ith four-car an equipment car comprising one coach

U. S. than 7½ in. m al- n ex- , and Alclad

alse floor is riveted to the underframe. At joints between coaches, rubber diaphragms, closed by zippers, give a smooth, weatherproof seal (see arrow, picture below).

All heating and air-conditioning equipment for the four-coach units is carried in the equipment car. It also carries the kitchenette, toilet facilities, a wardrobe, and control locker. Entrance to the coach units is through a door in the equipment car.

Looking through coach to lounge

Talgo units have no draft gear. Coupler is a simple jaw-and-pin unit, which normally transmits only pulling force. Coupler will, in emergencies, pivot and carry the entire load from the front end. Vertical load is carried on two load bearers, 32 in. above the track. Load bearers, plus the two wheels, provide the four-point suspension.

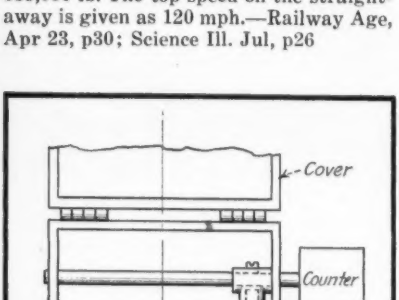
Wheels are similar to those used on street cars. They have built-up wheel centers of welded construction and a steel tire connected to the core by a rubber sandwich to reduce noise. The expanding, automotive-type brakes are hydraulically operated. Maximum brake-cylinder pressure is 100 psi., which gives 250-psi. pressure in the system. Wheels are roller-bearing equipped.

Front end of each unit has an auxiliary jacking unit mounted directly above each rail. The dolly wheel is actuated by crank and worm gear. This jacking unit raises the car for coupling and uncoupling and for movement of the separated unit.

Interior finishing is pleasing. The eight

pairs of reclining airline seats are placed on 42-in. centers. Wainscoting is ⅛-in. Plymetl, and the heading to wainscoting is aluminum. Windows are double-glazed, having semi-circular ends.

Locomotive, designed specially for the Talgo train, is powered by four automatic-type diesel engines—two engines supplying the motive power and two the auxiliary power. Locomotive weighs 135,000 lb. The top speed on the straightaway is given as 120 mph.—Railway Age, Apr 23, p30; Science Ill. Jul, p26



COUNTS KNOTS OR SLUBS

Counting knots and slubs in yarn is simplified by this counter developed by Berkeley Testing Device Co. Yarn is not damaged. Yarn passes between two metal plates, separated by the diameter of the yarn. If a knot is encountered, plates bend backward, the knot slipping down and through opening at bottom. Bending of plates activates counter.—Textile World, May, p143

Coating Applied Like Paint Gives Corrosion Resistance

Two years' field experience tends to substantiate expectations of Zincilate, a liquid zinc-content coating to provide corrosion resistance to iron and steel. Made by Industrial Metal Protectives, Inc., the material provides an impervious coating of good adhesion without need for preliminary priming or chemical surface treatment. Salt-spray life runs over 1,000 hr.

Applied like paint, the coating is gray in appearance and strongly resistant to abrasion. Best surface preparation is abrasive blasting. The basic formulation involves baking the coated parts. After spraying, the coating is allowed to set for 5-15 min. until a matte finish appears, and then is baked for 1 hr. at 300°F. or 15 min. at 700°F.—Steel, Apr 25, p80

Grades Anodyzed Rivets

An electronic device at Glenn L. Martin Co. checks rivets and rejects those that do not meet anodic specifications. It has a magnetically operated lever energized by completing an electrical circuit between plate and contact point.

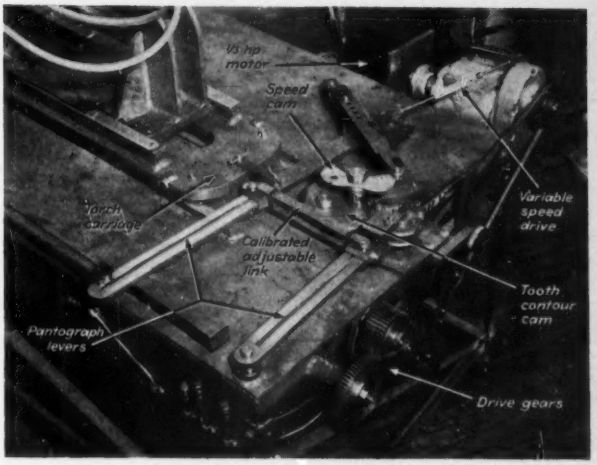
As rivets pass through the device, the contact point touches the head of each rivet. If the anodic coating is below standard, a small relay is energized and the rivet is thrown out.—Elec C&M, May, p98

Hung Forms Save Scaffolding

Much high construction scaffolding was saved by Dinwiddie Construction Co. in concrete-fireproofing of a deep plate girder by pouring into forms hung to studs on the bottom flange. Bottom flange was wrapped with wire mesh and studs were welded to bottom flange. Bottom of form was bolted to these studs and side forms were built up.—Cons Meth, May, p41

CAM CONTROLS GEAR CONTOUR

Machine to flame-cut gears has cutting motion controlled by cam and pantograph. Torch is mounted on sliding carriage, the rear end of which is attached to pantograph lever. Follower on other lever contacts tooth contour cam. Variable-speed drive unit is controlled by speed cam on same shaft as contour cam. Cutting each tooth requires four accelerations and decelerations of work spindle and torch carriage. Manufacturer is Cogmatic Co.—Prod Eng, May, p102



Improved Process Applies Coagulation to White Liquor

Pilot-plant studies by Infilco, Inc., has led to the development of a new commercial process for making sulphate cooking (white) liquor in the paper industry. It was found that coagulation by addition of magnesium sulphate accelerates clarification and improves physical and chemical properties of both muds and liquors.

Essentially all iron compounds are removed prior to causticizing. Thus, the settling rate of the causticized liquor is not hindered and the catalytic effect of the iron in furthering fiber degradation in the bleaching process is eliminated.

The process allows use of smaller settling tanks free from internal moving mechanisms wherein each step takes place in a separate tank. Centrifugals may be used not only to dewater the final mud, but also to separate cooking liquor from strong mud because clarification and mud removal are entirely distinct.

Unit functions of this new process may be incorporated in conventional installations to increase efficiencies and to improve resultant quality.—Paper Ind & World, Apr, p64

New Arc-Welding Method Uses Built-Up Mold

A welding method that calls for a carbon mold to be built inside the work has been developed in Germany. Known as "hot welding," the process does not butt weld the two pieces nor is there a welding groove made.

Instead a cast mold is formed around the part to be welded, and the mold filled with fluid metal as in thermit welding.

A crack in a steam cylinder, for instance, is first prepared by drilling out a U around the crack location. Carbon plates are positioned outside and inside the cylinder to give the original shape.

The cylinder is heated by a charcoal fire in an annealing pit, and the U then filled up by arc welding. The work is not removed from the pit until it is completely cool; this may take 10-12 days for large pieces.—Weld Eng, May, p39

Tailor-Made Job Evaluation Assures Workable Plan

To guarantee maximum effectiveness, a job-evaluation plan must be tailored to fit the needs of the specific manufacturing operation to which it is to be applied. To do this, RCA Victor developed this four-point plan:

1. Only those factors which could be identified as present in every operation should be used. Factors had to be distinct enough for observation, description, and evaluation.

2. Weighting of factors should be established to reflect relative importance of various factors in the entire operation.

3. Basic factor definitions and point values should be set to reflect the worth of each factor in relation to the whole.

4. Best features of point system and factor-comparison system should be adapted.

RCA studied 10% of the jobs in the plant to identify basic factors. Then these were weighted according to the relative importance of the job. Accuracy of evaluation process was increased by the definitions.

Each individual factor was studied separately since human factors never follow a straight curve. It was found that lower degrees of education were more important than the higher degrees so the lower were assigned higher point values.

A "key job list" of 20 jobs was compiled and all jobs were evaluated against key list and against each other. Jobs were then ranked according to their total point value.—Factory, May, p78

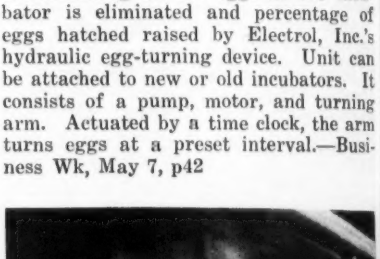
Reduces Crown Accidents

Shell Oil Co., Inc., has added several safety devices to its oil-well drilling rigs to reduce accidents from running into the crown during hoisting. One is a derrick extension, 14 ft. long and of same dimensions as top of rig. Legs are straight, so the extension doubles the safety space.

Another device, used with the extension, is an automatic photocell installation that warns the driller of approach to the crown. Another type of device also used for crown warning is a limit switch to sound a warning signal.—Oil & Gas J, Mar 31, p102

Simplifies Egg Hatching

Hand-turning of the eggs in the incubator is eliminated and percentage of eggs hatched raised by Electrol, Inc.'s hydraulic egg-turning device. Unit can be attached to new or old incubators. It consists of a pump, motor, and turning arm. Actuated by a time clock, the arm turns eggs at a preset interval.—Business Wk, May 7, p42



CHEWS UP FROZEN FOODS

Hydraulic comminuting machine made by Bryant Machinery Co. prepares frozen cream and butter for ice-cream mixes without previous thawing. Products are pushed through the fixed knife assembly shown here by a reciprocating piston. Machine will handle products up to 14½x14½x16 in. and produce comminuted pieces 2x3 in. in cross-section and of varying lengths.—Food Ind, May, p85

Future Coal-Mining Methods

Full- and semi-longwall mining plans may replace room-and-pillar mining; systems are successful especially where mine prices are high

ROOM-AND-PILLAR MINING, as practiced widely in the United States, may soon give way to full- or semi-longwall mining. Advantages of room-and-pillar mining are many. But most important, it gives easiest roof control of any plan, solid coal serving best as roof support.

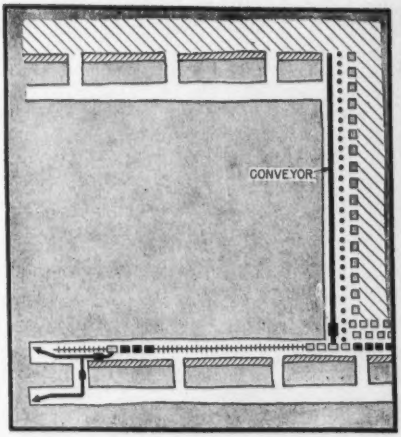
Major disadvantage is that continuous production is difficult—at times impossible. Crosscutting is required in all cases and, if pillars are mined, it is necessary to stop the mining operation and shift equipment each time a pillar is mined.

The alternative plans are full- or semi-longwall mining. In full-longwall mining, a continuous face, circular or approximately so, is worked continuously in either direction from a center opening (advancing) or back to the opening (retreating).

Roof is supported and permitted to subside a limited distance—one-fourth to one-third of the seam thickness—by building packwalls of roof or floor material or material brought in from the outside. Filling may be done by flashing, blowing, or mechanically filling, often called "stowing." Packwalls and stowing are common in Great Britain and on the Continent.

Since packwalls are expensive, they have been used little in the U. S. High mine prices, as in the anthracite industry, can make the pratice worthwhile here. Conventional posts cannot be substituted for packing and filling.

In semi-longwall mining, a wall of varying length is established between two entries or openings. In addition to straight walls, plan can be used on V, half-V, and similar mining system. Mining can be done straightaway and as nearly continuous as any plan. A more ticklish roof-control problem may arise.



CONTINUOUS semi-longwall plan for hand-loading onto face conveyor shows crib and timber supports for roof control

Roof-control problems may be caused by lack of knowledge of roof behavior under semi-longwall conditions and lack of low-cost artificial roof supports.

Semi-longwall system can be used with crawler loaders and track and mine cars with success. Shuttle cars eliminate need of trackage and conveyor moves. They can handle any output.

The mining plan illustrated can be used with either chain or shaker conveyors, even with machine loading. If conveyors are used, maximum face length should not be more than 300 ft. Work can advance or retreat. Control of roof is easier in the advance. When bad roof conditions exist, face can be advanced or retreated 100–150 ft. Then a pillar is left and a new opening driven across the block to form a new wall.—Coal Age, May, p74

Exposure to Microwaves Generates Dangerous Heat

Preliminary experiments conducted in the U. S. on rabbits indicate that injury by exposure to microwave radiation may occur at relatively low field intensity. Most vulnerable spots of the body are those not abundantly supplied and therefore cooled by blood.

Eye cataracts were formed upon exposure for 10 min. at a field intensity of 3 watts per sq. cm. at a 12-cm. wavelength. At longer wavelengths, the temperature of the whole body was increased, giving rise to artificial fever but with little tissue damage.

At extremely high frequencies, the energy is absorbed near the surface, which may cause severe burns. At wavelengths near 10 cm., however, highest temperatures occur about an inch below the surface. The danger lies in heat generation without pain or fever.—Electronics, May, p66

SPEEDS CAN HANDLING

Magnetic lift made by Technalectric Co. makes can handling from pallet to unscrambler a simple job. Pallet is placed on roller conveyor and pushed into machine. Elevator raises load to level controlled by photoelectric cell. Magnet at top is turned on, and first layer of cans jumps to magnet face. Shuttle carriage then carries magnet over belt conveyor where cans are released for feeding to unscrambler.—Food Ind, Apr, p86

Radio Technique Now Useful To Explore Mineral Deposits

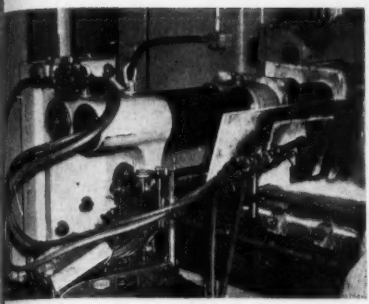
Practicality of transmitting radio waves through the earth's surface to locate mineral deposits has been proven feasible by Wm. M. Barret, Inc. The technique was tried successfully at a Morton Salt Co. mine when waves were transmitted through 600 ft. of sedimentaries, including 400 ft. of salt.

System has usually been used to locate and delineate placer and lode deposits of gold; to map viens, faults, dikes, sills, deposits of scheelite, sulphide ore bodies, igneous intrusions; and to map formation contracts.

Unique transmission and receiving equipment overcomes reflection of waves at ground and compensates for attenuation of waves to the earth. To do this, surface wave is directed along air-earth boundary by a radiating device; as wave moves, it is refracted into the earth along parallel ray paths. On striking subsurface strata, waves are partially reflected along parallel ray paths to the surface and are again refracted to air-earth boundary to rejoin surface waves.—Eng & Min J, May, p81

Compost from Textile Waste

A new organic compost is being produced from textile waste by Greengrow, Inc. Any organic textile waste—cotton, ramie, hemp, jute, sawdust—can be used. Bacteria are "planted" in the waste, and fed nitrogen and other gases as the waste decays. Called Humex, the compost is merely the speeded-up result of natural decay. A 100-ton per day plant costs $25,000.—Business Wk, May 7, p44



TORCH HEATING of the work with asbestos guards is practical in . . .

Milling High-Strength Alloys at High Temperatures

Milling high-strength alloys creates the problem of obtaining reasonable tool life. One solution involves reducing cutting speed and feed. Another is to increase speed and feed but to preheat the work, either in a furnace or on the milling machine.

Research at Kearney & Trecker Corp. was carried on under both conditions. Slab-milling tests were made with a flat steel plate heated by a surface torch. Cutter and spindle were shielded by asbestos board. Before table feed was engaged, torch was lighted and flame adjusted with the spindle running.

Heating to 1200°F softened the steel and cushioned the shock when the cutter tooth entered the work. Feed was 60 ipm., speed 236 sfpm. Results were considerably lower power requirements than with an unheated workpiece. The tests showed definitely that, because of reduced power consumption, milling is possible at greatly increased feeds.

Carbides and cast alloys are suitable tool materials at the temperatures used, up to 1500°F. Hardness of tool steel and high-speed steel drops off too much at these elevated temperatures.—Iron Age, Apr 28, p66

Spark Guard Prevents Fires in Electrostatic Spraying

Electrostatic spraying utilizes a 100,000-volt potential. If ventilation equipment fails to function or if an accident occurs, such as parts falling in the spray booth, sparking may occur and start a fire.

This condition can be prevented by an electronic safety device called a spark guard, which deenergizes all spray equipment. Its major component is a thyratron tube in series with the holding voltage circuit of a five-pole contactor.

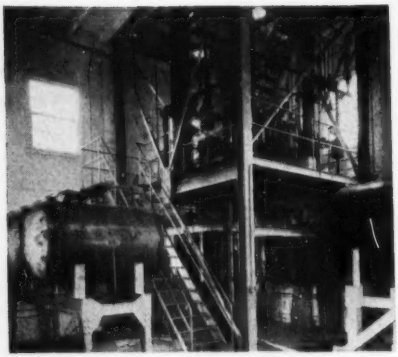
Sparking fires the thyratron, thus energizing a two-pole relay that opens the holding voltage circuit. As a result, the high-voltage transformer circuit is opened, halting all spray-booth operations.

A locking switch, normally open, allows bypassing of the spark guard. This may be necessary to maintain production on an emergency basis if any part of the guard fails and cannot be immediately repaired or replaced.—Electronics, May, p138

Belt Slope Cuts Coal Cost

Using a 2,600-ft. center-to-center belt slope up a 15% grade, Moffat Coal Co. has realized both a direct saving in transportation cost and also indirect savings by reducing cost and speeding rehabilitation of the colliery. Belt is the longest high-lift belt in operation. It is fed from two permanent and one temporary loading points. On the surface, belt discharges to a 1,300-ft. overland belt declining on a 3° grade to tipple.

Mining at 12 levels, the company has realized a 50¢-per-ton cost reduction. Belt reduced by 3 years normal time for reopening, clean-up, and development methods. Belt moves in a 14x7-ft. tunnel. Belt itself is 36-in. wide Ustex-Nylong, a combination high-strength cotton and nylon fiber.—Coal Age, May, p78



REFINES PEPPERMINT OIL

The world's first continuous still for fractionating peppermint oil has just gone into operation at I. P. Callison & Sons. From holding tank at bottom of still, oil is pumped to "heads" column from which medium- and high-boiling fractions are pumped to "products" column. Finished oil is drawn from latter column. Both columns use low-pressure steam. High reflux ratio permits concentrating and isolating minute fractions of the oil.—Chem Eng, Apr, p108

Clamps Aid Welding of Large-Diameter Pipelines

The growing number of long-distance oil and gas pipelines has led to development of welding techniques to replace manual effort with power equipment. One such device clamps pipe for welding abutting ends.

It is an internal expander that brings pipe ends to true circles and forces out any small irregularities. The crank type carries four pairs of curved guides to bring the two ends into approximate alignment.

The device is set and expanded in the last welded joint and held in place with stops that provide desired gap between ends. When the new pipe is shoved up over the guides, further turns of the crank bring circle of end closely to that of the line.—Weld Eng, Apr, p33

Hot-Cold Baths for R. R. Ties

Adequate absorption and distribution of preservative in railroad ties proved adequate and economical in Dow Chemical Co.'s tests of pentochlorophenol-in-oil solutions. Hot-and-cold bath process, a non-pressure treatment, was used in the tests. Good absorption was due in part to the partial vacuum created.

Two ties were tested. They were first immersed in the preservative oil solution. Then oil was heated to desired temperature, the ties' temperature being measured by thermocouples. On reaching proper temperature, hot oil was pumped off and cold oil entered. Ties were left in cold oil overnight.—Railway Engrg & Maint, May, p478

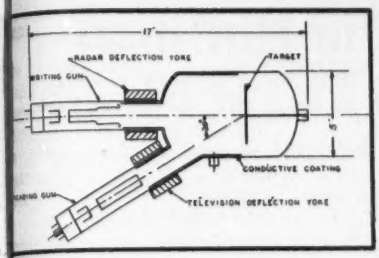
Non-Woven Laminate Filler

Wellington Sears & Co., after 2 years of pilot-plant operation and field testing, has announced development of six bonded fabrics for use as fillers in high- and low-pressure laminates. Fibers are distributed in random directions, giving equal strength in all horizontal directions. Each style of fabric has a different percentage of resin, ranging from 5-35%.

For high-pressure laminates, fibers are cotton. For low-pressure work, fibers are cotton, acetate, or a mixture of both. Fillers cost 10-15% less than woven fabrics but cannot compete with paper fillers.—Mod Plastics, May, p70

Old Mines—New Oil Depot

In Sweden, two old feldspar mines have been converted to underground oil storage tanks with a capacity of 14 normal tanker cargoes. The oil, pumped direct from tankers into mines, rests on salt water and can be skimmed off to within ½ in. of salt-water level. Viscosity of oil is kept at a suitable degree by a 450-m. copper heating coil installed in previous mine galleries.—Chem Eng, May, p241



ROTOTYPE TUBE had V-shape guns but, s now modified, guns are at opposite ends f a straight cylindrical tube

Memory Tube Picks Up and Remembers Radar Signals

A thin layer of pure quartz in a special lectron tube retains and intensifies the leeting images on a radar screen. Called he Graphechon by Radio Corp. of Amer-a, it is a booster device placed between adar-beam receiver and television kine-cope reproducer.

Possessing "visual memory," the tube ntains, for over 1 min., images of nor-al life of less than 0.000001 sec. Elec-on beams from the "reading," or icono-cope, gun strikes the quartz-coated arget and knocks off electrons which fly o the conductive lining. This results in a point of equilibrium on the target sur-face, and the quartz coating acts as an nsulator and permits charging of sur-face to a voltage higher than that of the metal sheet.

At this point, the radar, or "writing," eam, as it receives a reflection, crashes lectrons through the quartz layer, mak-ng it conducting, so discharging the volt-ge. The iconoscope beam then knocks lectrons from the target at that spot in rying to bring it back to the equilibrium. This removal of electrons produces a ignal on the target that is amplified and pplied to the kinescope. To bring the hole signal area back to equilibrium ay take 2,000 scans at 30 per sec., or bout 1 min.—Prod Eng, May, p149

Package-to-Package Method Saves in Combination Yarns

Important manufacturing savings can be realized in the manufacture of combination yarns by using a package-to-package procedure. For pound-package combination setup, procedure starts with magazined cones of acetate rayon and half-pound package bobbins of crepe.

Once double-twisters have been creeled and started, they should not be stopped. Each spindle should be doffed as crepe runs out. Stopping the entire machine and breaking out ends wastes time and damages quality through unnecessary knots. Ring-twister packages should be balanced with up-twisters.

Procedure works best using bobbin trucks rather than supplying bobbins and yarns on the machines. Trucks will eliminate one or two handling operations and keep loose ends from twisting into running yarn.—Textile World, May, p141

Ribbon-Anode Protection

Magnesium ribbon-type anode for cathodic protection of buried metal structures from corrosion has been developed by Dow Chemical Co. It is intended primarily for use in high-resistivity soils where cast anodes may not be practical because of low-current output under such conditions.

The new anode has a ⅝x⅜-in. cross-section. It contains a centrally located core of iron wire to facilitate making permanent electrical connections and to prevent segregation. Because of its shape, it supplies three to seven times as much current per pound of material as does the cast anode.

The ribbon can be installed simply by using a wire-laying plow. Connections are made to long structures, such as pipelines, at 500-1,000 ft., or closer if current flows are large. Underwater structures also can be adequately protected.—Elec World, May 7, p82

New Discoveries in Nutrition

Food-processing industries should watch closely all advances made in the field of nutrition and be ready to adapt their materials to new uses

THE PAST TWO YEARS have seen notable progress in nutritional developments—in the fields of vitamins, trace elements, halides, amino acids.

Last year, folic acid was a newly identified vitamin B complex. This year there are B_{12}, B_{13}, and B_{14}. Folic acid and vitamin B_{12} are related in function. B_{14} also is apparently related to folic acid in molecular structure and biological function.

Folic acid is contained in green leafy foods, fresh fruits, and liver. Its chief functional role, beyond being essential for human growth, is to afford protection against specific types of anemia characterized by large red blood cells.

Vitamin B_{12} is effective against pernicious anemia. B_{14} is reported to cure a form of anemia commonly associated with folic-acid deficiency.

Trace elements (mineral elements in organic form) are increasingly recognized as of nutritional significance. Thus, vitamin B_{12} has cobalt present. And copper has been shown to be of value in promoting more rapid recovery from anemia when it was added to milk in feeding tests with infants. But the considerable amount of propaganda as to the healthful effects of trace elements is not yet justified by the evidence to date.

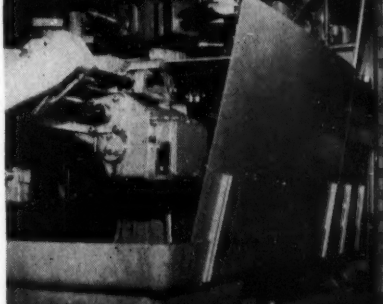
The situation differs with iodine, which is of definite value to humans in the form of iodized salt. Another halide, fluorine, is gaining popularity as a protection, in the form of fluorides, against tooth decay.

Calcium intake is a subject of current discussion. The National Research Council has recommended an increase of 20% to the adult intake in the U. S. Suggested minimum is 1 gram per day.

But calcium utilization, which measures its effectiveness, depends on the intake of vitamins D, A, and C, and possibly of phosphorus, magnesium, sodium, and potassium. This emphasis on calcium is encouraging greater use of milk as a protective food and of calcium phosphate in leavening agents and readymix bakery goods.

Information now available on amino acids indicates eight to be essential, in contrast to the albino rat's requirements of ten amino acids. A vital aspect of recent research work is concerned with the critical importance of timing as a factor in controlling the efficiency with which individual amino acids are used.

Other research work deals with pellagra and the discovery of the importance of tryptophane, which is one of the less stable amino acids. Still more recent research has revealed that vitamin B_6 con-



VIBRATION-ABSORBING PADS

All machines in Hendrickson Motor Truck Co.'s new plant are mounted on these vibration-absorbing pads. Cost of pads was less than cost of drilling holes for anchor bolts. Their use simplifies machine movement. The heavy-duty turret lathe shown weighs 8,250 lb.—Factory, Apr, p 91

rols the normal metabolic use of trypto-hane.

Another substance, choline, is getting tensive study in two directions. Choline ficiency in albino rats has led to the velopment of changes that resembled man hypertension. The second interest-g finding is that a generous intake can ert a favorable influence in warding f cancer-type growths.—Food Ind, May, 2

utomatic Palletizer Cuts alleting Cost, Hand Stacking

oman Cleanser Co. has reduced palletiz-g costs and eliminated hand-stacking of allets by adoption of two Production ds, Inc., automatic pallet-loading ma-hines. Two men now do the work form-ly done by four. Broken cases and mashed bottles have been virtually minated.

Machine is designed to handle any mooth, flush carton not less than 8½ in. length or width and not more than 24 long and 18 in. wide. Maximum llet load is 40x48x70 in., weighing no re than 2,150 lb.

Filled shipping cartons move directly m packing line into loader. Empty llets are fed into pallet hopper. Ac-erator rolls space cartons entering chine for stacking sequence. Turn-le rotates proper cartons for stacking ttern. Power ram pushes cartons in ceeding rows.—Mod Packaging, May, 0

ow To Save a Million

neral Foods Corp. now saves $1-mil-on a year by an effective safety pro-ram launched in 1945. Accidents at at time were considered to be too high. survey showed 80% were caused by safe acts of workers.

A majority of these were the result of ree acts: taking an unsafe position, ing unsafe equipment, and failing to use protective devices. An intensive, continuous campaign with slogans, meetings, and worker participation has had these results: 25 lost-time accidents for each million man-hours in 1944, 22 in '45, 13 in '46, 11 in '47, and only 6.8 in '48.—Food Ind, May, p60

MECHANICAL CORN DRYING

Corn-belt farmer is drying ear corn by hot air. Building has two cribs with tight sides and slatted floors. Hot air is blown into large plenum chamber beneath each crib from oil-burning dryer supplying 16,800 cfm. Moisture content in 390 bu. was reduced from 42 to 20% in 61 hr. Total cost was 12¢ per bu.—Elec World, Apr 9, p120

Rock Salt Good for De-Icing

Saratoga County, N. Y., highway department saved $4.27 per mi. of highway this winter by substituting rock salt for sodium-chloride-treated sand. Salt eliminated need to clean pavements, ditches, and shoulders in the spring. Cost of applying the sand to 216 mi. of highway was $49,792 during 1946–47. Snowfall amounted to 83 in. that year. This winter, with 117.5 in. of snow, salt cost only $38,936. Salt was spread from a standard hopper attached to dump truck at a rate of 400 lb. per mi.—Eng News-Rec, Mar 31, p52

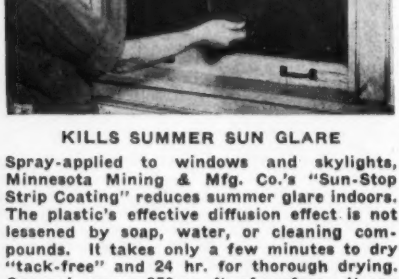
New Products

Self-loading Lift-truck—Combining load and carrying, Hull Mfg. Co.'s "Traveloader" self-loads from the side onto a carrying platform. Built in three sizes, the unit has lifting capacities of 3,000, 10,000, and 30,000 lb. Unit can operate in narrow aisles. Over road it is capable of 30 mph.—Factory, May, p184

Centrifugal Clutch—Designed to relieve a motor of its starting load, clutch accommodates ratings of 1/6-½ hp. It is applicable to any assembly where high starting torque is desired, as in air compressors or pumps. It is made by Yoder Clutch Corp.—Prod Eng, Apr, p172

Floatless Level Control—Liquid level is regulated by Automatic Control Co.'s type X Prob-O-Trol. Unit is tubeless ac. control, combining a probe circuit and transformer to operate dc. relay through a rectifier.—Oper Eng, May, p66

Paint Foundation—A vinyl-base, quick drying wet primer, intended for application over wet or dry, clean or rusted metal including steel, aluminum, or galvanizing, is offered by Wilbur & Williams Co. It provides a hard foundation for any paint, even ship-bottom paints.—Foundry, Apr, p235



KILLS SUMMER SUN GLARE

Spray-applied to windows and skylights, Minnesota Mining & Mfg. Co.'s "Sun-Stop Strip Coating" reduces summer glare indoors. The plastic's effective diffusion effect is not lessened by soap, water, or cleaning compounds. It takes only a few minutes to dry "tack-free" and 24 hr. for thorough drying. One gal. covers 250 sq. ft. of surface. It can be peeled off by hand.—Business Wk, Apr 23, p67

Cloth Inspected "Stationary"—Developed by the Institute of Textile Technology, a new cloth inspection machine permits inspection of cloth through a stationary image screen 18 in. at a time. An oscillating mirror tracks cloth as it moves, then flicks back, giving a slight overlap. Eye strain is reduced; better, faster grading should be possible. Machine runs 20-60 yd. per min.—Textile World, May, p154

Measures Chemicals—Buffalo Meter Co. is offering stainless-steel chemical meters of volumetric type for measuring corrosive liquids in capacities of 3-160 gpm. Products handled—caustic soda, acids, molten sulphur, similar materials.—Chem Eng, Apr, p136

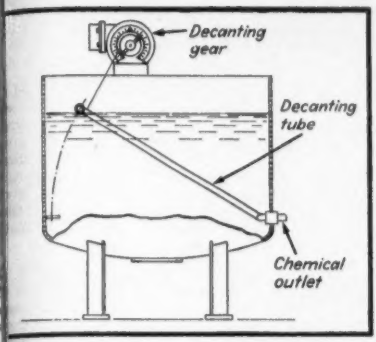
Drip-proof Motors—Wagner Electric Co.'s new polyphase motors have frames of drip-proof design. They are formed of rolled steel, so shaped as to center the stator core and provide passages between frame and core for ventilation by an auxiliary fan.—Prod Eng, May, p136

Anti-bacterial Cement—Concrete made with North American Cement Corp.'s new cement kills bacteria on contact. It does not injure humans or animals. It will find use in dairies, restrooms, and other places where bacteria thrive. It is mixed in the same way as normal portland cement. Physical properties are also the same.—Eng News-Rec, Apr 21, p44

New Cargo Tiedown—Cargo tiedown is speeded by a new device developed by Peck & Hale. It has been adopted by several airlines. Unit consists of two sections of wire rope, one beaded like a necklace, and a toggle lock. Operating much like a beaded key-chain, beaded end is joined to toggle with handle open. As toggle closes, pressure is exerted. Length of cable can be adjusted.—Aviation Wk, May 2, p48

Infrared Analyzer—Automatic analysis of six different components in a flowing stream of a liquid or gaseous sample can be made by Perkin-Elmer Corp.'s model 12-D analyzer. Automatic turret has 12 positions—one reference standardization and one absorption point for each component.—Electronics, May, p130

Portable Solderer, Heater—Measuring 2¼x13 in., Industrial Engineered Products Co.'s general utility hand torch holds enough fuel for a day's burning. Operating on liquid petroleum, it can do light brazing, soldering, or heating. A single valve turns torch on or off and adjusts flame.—Bus Trans, May, p169



FEEDS CHEMICALS AUTOMATICALLY

Special decanting gear lowers swing-pipe decanting tube automatically into chemical agitating tank to feed chemicals to water softeners. Meter controls feeding rate. Cable drum is driven by 1/40-hp. synchronous motor. Worthington Pump & Machinery Corp. developed the feeder.—Power, May, p192

Industrial Transformers—Three-phase distribution transformers for small industrial or commercial loads have De-ion lightning arresters and three heavy-duty circuit breakers on the secondary side. Made by Westinghouse Electric Corp., sizes available are 9 to 75 kva. for primaries of 2,400-14,400 v.—Elec West, Apr, p54

Conditions Sand—Beardsley & Piper Div. of Pettibone Mulliken Corp. has announced a machine for complete sand conditioning. Capacity is 40 tons per hr. Machine is self-propelled at 4½-36 fpm. forward and reverse.—Foundry, May, p276

Gages Coating Thickness—The Coatingage, developed by Branson Instruments, Inc., measures thickness of nonmagnetic coatings on iron or steel over a range of 0.0001-0.5 in. Operation is based on changes in reluctance of magnetic circuit as caused by increasing the gap between probe coil and base metal by amount of thickness.—Electronics, May, p188

Insect Killers—Two new aerosol insecticides—dispersed in Freon gas under pressure—have been developed by Bridgeport Brass Co. "Surface Coat" is a residual insecticide retaining its strength for 60-90 days. It's 2% chlorodane and 3% DDT. "Mothproofer" is a 10% du Pont methoxychlor and ½-1% repellent that kills moth larvae and discourages egg laying.—Business Wk, Apr 23, p72

Loads Cases Automatically—New machine comprises a feeder and loader. Incoming containers are divided into four lanes. Twelve containers are removed from lanes, lifted upward, and placed in loading chute to form a tier. This is repeated for second tier, then loading shoe pushes two tiers into case. Machine is made by Food Machinery & Chemical Corp.—Food Ind, May, p171

Concrete Bucket—Johnson Lo-Slump concrete bucket, made by Koehring Co., handles concrete of any stiffness. Double clam discharge gate can be operated by hand or air. Sizes are 2, 3, 4, and 8 cu. yd.—Am Builder, May, p144

Adjustable Lift Truck—Any tote pan from 8 to 24 in. in width and weighing up to 1,000 lb. can be carried by an adjustable lift truck developed by Lyon-Raymond Corp. Width is adjusted by eight set screws controlling telescoping frame. Height is changed by raising or lowering side plates.—Ind Dist, May, p180

Seamless, Interlocking Knitter — Ordnance Gauge Co.'s 8-feed, seamless interlock circular knitter is being manufactured in 18-, 20-, 22-, and 24-in. sizes with 8, 9, and 10 needles per in. Each feed has a 3-color positive yarn changer, feeds being thrown in or out of action at will.—Textile World, May, p152

Dual Pivot Dump Car—Paceco Mine Car Co.'s new dual pivot-tilting dump car is available in 16- and 20-cu. ft. sizes. Cars are built for 18-in. track. Tilt over front end and at sides is 45%.—Eng & Min J, May, p119

Saturable Reactor Welder—New line of ac. welders employs a saturable reactor for regulating instead of a variable air gap. Output is varied by changing dc. magnetization of core, thereby choosing different values of reactor-coil impedance. Machine was developed by Harnischfeger Corp.—Weld Eng, May, p60

Jet-pump Motors—B-Line jet-pump motors, made by Brown-Brockmeyer Co., are available from 1/6-1 hp. Of flat-face type, they are suitable for vertical or horizontal mounting. Line includes single-phase capacitor start, two- or three-phase squirrel cage, and compound wound d.c. motors.—Elec C&M, May, p103

Duplex Strainer—Continuous flow of fluids is not interrupted for cleaning the strainer with J. A. Zurn Mfg. Co.'s disk-type duplex strainer. Liquid is diverted from one straining chamber to another by a handwheel. Strainer is perforated basket type, set eccentrically to the chamber to minimize pressure drop.—Paper Ind & World, Apr, p118

New Products (Cont.)

FLEXIBLE CARRIER

Tilting and turning of heavy materials is eased by this rotating crane developed by Cleveland Crane & Engineering Co. It has travel motions of a standard crane plus a rotating carrier that operates on a circular track. Hook can be raised, lowered, or tilted upward or downward. It works clockwise or counterclockwise. It is available in many sizes and capacities.—Business Wk, May 7, p46

Long-life Industrial Battery—Electric Storage Battery Co. is offering glass-jar storage battery that features long life and less weight per amp.-hr. output. Positive plate has active material as pure lead buttons. Negative plate is lead antimony grid and series of connected vertical ribs. Battery is designed for railway signaling, emergency power, similar applications.—Power, May, p186

Odor-killing Garbage Can—Lincoln Metal Products Corp.'s new "step-on" garbage can is fitted with a chlorophyl chemical cake that kills garbage can odors. Cake lasts about one month; refills are available.—Hardware Age, May 5, p210

Plays All Records—Standard and long-playing phonograph records can be handled by a pickup arm made by Proctor Soundex Corp. The arm features a carrier that slides the cartridge in and out of the unit for instant substitution. Stylus pressure can be selected as desired.—Electronics, Apr, p181

Checks Solar House Design—Libby-Owens-Ford Glass Co. has developed a device to enable designers and builders of solar houses to check the sun's angle in any part of the world at any time. The "Solarmeter" helps determine roof overhang for summer shading. By adjusting the "mechanical sun," designer can observe how rays strike glass areas.—Cons Meth, May, p54

Radiant-control Toaster—Sunbeam Corp. announces a new two-slice, domestic toaster. It has a radiation-sensitive device that responds only to heat emitted from surface of toasted bread. When heat reaches predetermined value, current is turned off and toast rises. Toast is always uniform.—Elec World, Apr 30, p29

Self-priming Pump—Developed by Gardner-Denver Co., self-priming "packaged" pumping unit has centrifugal pump close-coupled to air-cooled gasoline engine. Capacity is 75-250 gpm. at 110-ft. head—Food Ind, May, p172

Aluminum Air Cleaner—Westinghouse Electric Corp. is building 99-plate, all aluminum industrial precipitron air cleaners in two sizes—36 and 24 in. Capacities are 1,000 and 667 cfm. The 36-in. cell weighs 50 lb., making it easy and cheap to install.—Steel, May 2, p139

Truck-mounted Crane — American Steel Dredge Co. is offering a ½-yd., 10-ton crane and excavator that is convertible to all crane and shovel attachments. Truck has six wheels and is of 16-in., 45-lb. steel I-beam construction. One-man cab is offset for better visibility and boom clearance.—Oil & Gas J, Mar 31, p128

Tilting-arbor Saw—Compact 8-in. tilting-arbor saw has 2 5/16-in. deep cutting capacity with maximum cut at 45° of 1⅝ in. Dado cuts up to 13/16 in. can be made. Delta Mfg. Div., Rockwell Mfg. Co., manufactures the saw.—Am Builder, Apr, p168

Skip Hoist for Bags—A lightweight motorized skip hoist, called Upanover by maker Jacob House & Sons, is designed to discharge any flowable solid from bag into process vessel. Bag is inserted into skip at floor level and opened. Hoists lift and dump in less than 1 min.—Chem Eng, May, p168

Chemically-made Frost—Ammonium thiocyanate, developed by Koppers Co., Inc., acts as a man-made frost to defoliate cotton plants before harvest. It is a coal derivative. Cotton field is sprayed by plane, leaves withering and dropping off. Hands can pick faster and cleaner; mechanical pickers will not stain cotton.—Business Wk, Apr 30, p82

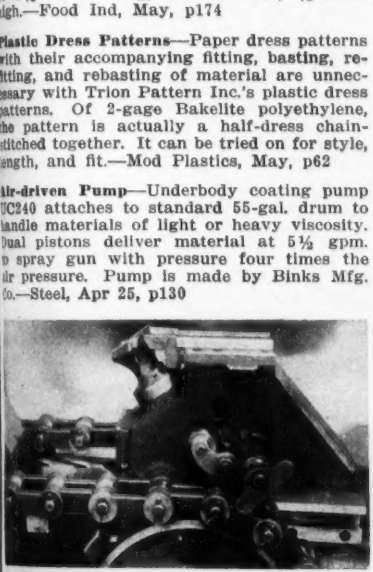
High-speed Diesel—Furnishing more power than any high-speed engine in production, Cummins Engine Co.'s NVHS-1200 diesel is V-cycle, 12-cylinder, V-type, 550-hp. supercharged unit. Companion unsupercharged unit is rated 400 hp. Intended uses include off-highway automotive units, mobile mining and construction equipment, shovels, cranes, draglines, generator sets, drilling rigs.—Power, May, p146

Measures Rotation—G. M. Giannini & Co. is offering telemetering rate gyros for rotational measurements from 10° to 1,000° per sec. Production gyros have accuracies of ± 2% and are standardized with resistance pickoffs of 2,000, 2,500 and 5,000 ohms.—Electronics, May, p132

Food Wrapper—Package Machinery Co.'s model F wrapping machine wraps food items in cellophane. Conveyor fed, the machine will handle 20-40 packages per min. in sizes of 3¾-16 in. long, 3-8 in. wide, ⅜-6 in. high.—Food Ind, May, p174

Plastic Dress Patterns—Paper dress patterns with their accompanying fitting, basting, refitting, and rebasting of material are unnecessary with Trion Pattern Inc.'s plastic dress patterns. Of 2-gage Bakelite polyethylene, the pattern is actually a half-dress chain-stitched together. It can be tried on for style, length, and fit.—Mod Plastics, May, p62

Air-driven Pump—Underbody coating pump UC240 attaches to standard 55-gal. drum to handle materials of light or heavy viscosity. Dual pistons deliver material at 5½ gpm. to spray gun with pressure four times the air pressure. Pump is made by Binks Mfg. Co.—Steel, Apr 25, p130



BROACHES ROCK BITS

Foote-Burt continuous-broaching machine produces 770 forged-steel rock bits per hour. Fixtures index between two 30-in. broach sections in the tunnel. Bits are fed through twice, with both sides of four flutes cut at 45 fpm.—Am Mach, May 5, p94

Scrap Disposal Truck—Carrying three tons of scrap, Service Caster & Truck Corp.'s scrap-disposal dump truck is made in varying chassis and running gear styles. It is spring mounted, hinged bottom permitting side dumping. Outside dimensions are 10x4x3½ ft. Wheels have press-on rubber tires.—Auto Ind, May 1, p51

Combination Lathe—R. K. LeBlond Machine Tool Co. is offering a lathe with a 60½-in. swing within a 5-ft. gap and a hollow spindle of 12½ in. Lathe bed is built in two sections, so the top bed slides on the lower. Other specifications include: 33½-in. swing over bed, 8-ft. center distance (13 ft. extended), 12 spindle speeds from 5-213 rpm.—Am Mach, Apr 21, p134

Clamshell Lift Truck—A 7/16-cu. yd. capacity clamshell bucket has been designed for attachment to Hyster Co.'s model 40 lift truck. Sand, gravel, chemicals, and other loose materials can be raised to a height of 8½ ft. Bucket is controlled by levers on the operator's right.—Eng News-Rec, May 12, p82

Adjustable-speed Drive—Metro Instrument Co.'s new variable-ratio speed changer for recorders, controllers, computers, and indicating mechanisms weighs less than 6 oz. It delivers torque of 70 oz.-in. and 0.025 hp. Ratio of input to output speed ranges between 1:6 increase and 6:1 decrease. Total speed range is 36:1.—Aviation Wk, May 2, p39

Plastic Insides—A plastic lining for drums and tanks has been developed by Poly-Cyclo Products Co. Called Cycloflex PC-11, it is a rugged chemically inert membrane, providing good resistance to corrosion and chemical attack.—Chem Eng, May, p188

Lightweight Insulation—Fiberglas XB-PF insulation material, made by Armstrong Cork Co., is intended for refrigeration and other low-temperature equipment. Available in two densities of ½ and 1 lb. per cu. ft., thermal conductivities at 75° F. are 0.25 and 0.22 Btu. per sq. ft. per hr. per in. thickness.—Prod Eng, May, p164

READER SERVICE

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Power Plant Features Economy

Innovations to produce power with maximum economy include standard turbine unit, small building volume, few painted surfaces

HUDSON PLANT of the Rockland Light & Power Co. now has in operation its first 20,000-kw. unit and will have an ultimate capacity of 120,000 kw. This unit is the first of a series of standardized plants designed by Burns & Roe, Inc. (see McG-H Digest, Apr, p29).

A pulverized-coal-fired integral-furnace boiler, rated at 200,000 lb. per hr., supplies steam to turbine at 850 psig., 900° F. The two-drum boiler has completely water-cooled walls for the furnace with a full-load heat release of 16,000 Btu. per hr. per cu. ft.

The installation has both an economizer and a tubular air heater. The boiler has one forced-draft fan and one induced-draft fan. Coal is prepared in two ball-race type pulverizers, while ash collects in a 14-ton hopper beneath the furnace from which it is sluiced to a 100-ton ash bin.

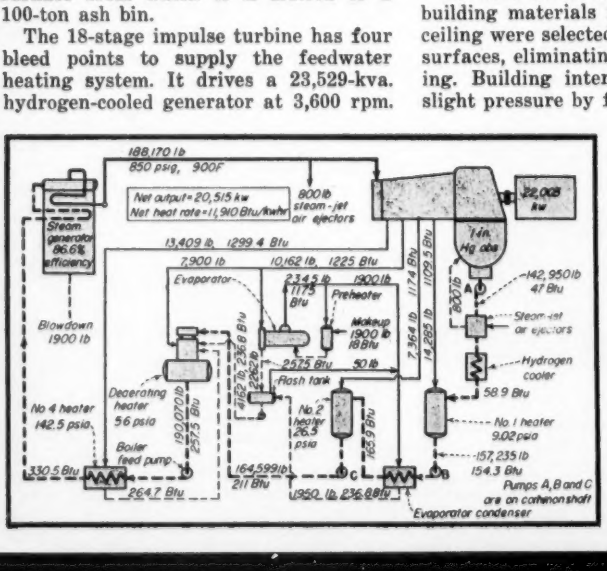
The 18-stage impulse turbine has four bleed points to supply the feedwater heating system. It drives a 23,529-kva. hydrogen-cooled generator at 3,600 rpm. The turbine-generator unit is supported on the condenser, and the condenser shell rests on bedrock.

The feedwater heating system is not complicated. Condensate from condenser hotwell passes through two open jet-type counter-current heaters in series and then enters the deaerating heater. Boiler feed pumps pass feedwater through a closed heater on its way to the economizer.

Makeup water passes through a hydrogen-zeolite treatment, then to the U-tube evaporator which is equipped with a preheater and condenser.

All moving equipment, except a coal conveyor, is on the operating-floor and basement levels. The operating floor has no division wall between turbogenerator and boiler.

To hold down maintenance costs, all building materials for walls, doors, and ceiling were selected for their permanent surfaces, eliminating the need for painting. Building interior is kept under a slight pressure by four 18,000-cfm. fans.



Actual building volume totals 550,000 cu. ft., as compared with 800,000 cu. ft. for more-conventional designs of same capacity. Compact arrangement

HEAT BALANCE uses all four bleed points in turbine and places evaporator in parallel with deaerating heater. First two heaters are vented, open type. Steam generator is 200,000-lb.-per-hr. unit supplying the turbine which exhausts at 1.5 in. Hg abs. Generator is rated at 20,000 kw.

akes only four men per shift necessary o run the plant.

Installed cost averaged $200 per rated w. This included cost of coalhandling quipment, water tunnels, screens, in-akes, water line, and land. Unit No. 2 f the same size will cost $185 per kw.—ower, May, p72

hannel Flushing—New in nduction-Melting Furnaces

new development in induction-melting urnaces, known as channel flushing, eeps channels between the two cham-ers of the furnace clean and free from ag. Primary coil of transformer of this indberg Engrg. Co. furnace causes more etal to go into one chamber than in the ther.

This raises the level of molten metal one chamber and lowers it in the other. hen, as the power is cut off every 60 ec., the higher level subsides and the etal flows between chambers. When he power is restored, molten metal is gain forced through the channel but in he opposite direction.

Thus the channel is flushed twice a inute. The first is the more important dross is released from the magnetic ld and removed. The constant flushing so is said to cause beneficial fluxing tion on the melt.—Am Mach, May 5, 144

hecks Balloons' Altitude

ltitude reached by weather balloons checked by a hypsometer developed by eneral Electric Co. Unit consists of a ny vacuum bottle holding five thimble-ls of carbon disulphide, a heating ele-ent, and a thermistor to change elec-ical resistance as temperature changes.

Liquid is brought to a boil at sea-level nd balloon is released. As balloon rises, quid continues to boil. Temperature-ensitive thermistor sends out electrical gnals to ground stations that translate signals to altitude. Unit works accurately up to 30-mi. altitude.—Business Wk, May 7, p44

ALUMINUM SUNSHADES

To shield 1,600 windows in the 13-story General Petroleum Bldg. from sun's rays, 59 aluminum vertical fins are used from the 3rd to the 13th floors. Fins are 129 ft. long, 6 in. wide, and 3½ ft. deep. Surface is fluted to diffuse light and eliminate glare.—Cons Meth, May, p54

Pumps Keep Haulageway Dry

Cost of track maintenance at Pittsburgh Coal Co. has been reduced along with other advantages of dry haulageway bottom by installation of seepage sumps and automatic pumping units. Now 6x6x6-ft. sumps, located at crosscuts, take up seepage. Water travels on a 5- to 6-ft. thick fireclay underbed.

Self-priming centrifugal pumps have been placed at average intervals of 785 ft. along sections of the main haulage. Pump operation is regulated by circuits opened or closed by two electrodes in the sump, one at low-water level and the other at high-water level.—Coal Age, May, p83

New Plaster Mold Casting Eliminates Final Machining

Developed by Euclid-Pioneer Div., Bendix Aviation Corp., a new technique of plaster mold casting gives complete control of critical dimensions and surfaces. Final balancing and machining are almost totally eliminated.

The process is adaptable to mass production. Complex constructions, previously cast in sections for machining, now can be cast as a single unit. Time, labor, and materials used are reduced.

The method permits thin, reinforced walls at a saving of weight without sacrifice of strength. Any non-ferrous metal can be used with the process on a mass-production basis.—Bus Trans, May, p164

Crate Tanks on Conveyor

Mission Appliance Corp. crates hot-water tanks on its assembly-line conveyors. Time is saved; necessary storage space is reduced. Wirebound crates can be stacked three high. They are fast to assemble and have high tear strength. The company is now producing 280 tanks with the same crew it used for 210 units.

Tank interior is first placed on the crate base on the conveyor. Insulation is affixed and conveyor carries it to enameling station. Top valves are put on and covered with a moisture- and dust-proof bag. Wrap around crate is then applied. Heaters can be moved four to a pallet by fork lift truck.—Factory, May, p110

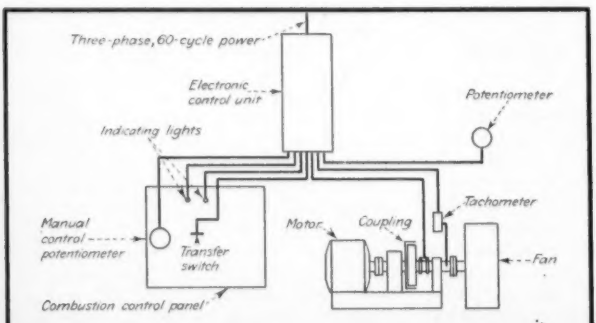
New Casein Monofilament

Azlon, a new casein fiber being produced both in monofilament and coarse-staple form, looms as more important in home furnishing and industrial fields than as a garment yarn. Being spun in filaments of 145–1,330 denier, it can be produced curled or straight. Fiber is resilient and not thermoplastic. Commercially, it is being blended with wool to form a filter felt.

It dyes easily, softens in hot water but recovers on drying. It will withstand 3 hr. of 200° F. conditions without damage if allowed to condition after such treatment.—Textile World, May, p106

Hoist Jack Pulls Tierods

Time, materials, and money are saved by a new system of pulling tierods from concrete forms devised by Turner Construction Co. Base of a hoist jack is placed against the form, and hook is affixed to tierod. Rod is then jacked out of form. Cost of tubes is saved and tierods are salvaged. One man can handle the 25-lb jack.—Cons Meth, Apr, p72



TUBE CONTROL OF FAN SPEED

Forced-draft boiler fan is driven by 200-hp magnetic drive electronically controlled. Ac. is rectified by six rectifier tubes. For control, rectifier circuit has tachometer on fan shaft and variable rheostat controlled by automatic combustion control system. As dc. to magnetic coupling changes, fan speed varies.—Elec World, Apr 23, p104

XPERIMENTAL USE for several months Lynwood, California, has shown that . . .

Siren-Controlled Device Reduces Crossing Hazards

A new street traffic device, called the Signal Ear, forecasts the arrival of any siren-blowing vehicle and operates traffic lights to stop traffic in all directions.

The siren detector is a parabolic sound reflector mounted at traffic-light level. As a siren approaches, a microphone inside reflector picks up sound and trips a relay that turns all traffic lights red.

Pickup circuits are tuned to high-frequency sounds. Only a siren can trip the relay switch. If a second siren is approaching the intersection from another direction, the nearest will trip the relay, thus giving it the right of way through the crossing.

Four cities in the U. S. will install these devices this year. More than a score more are considering it.—Electronics, May, p144

Torque Converter, Direct Drive Combined in New Packard

The 160-hp. Custom Eight Packard is equipped with an automatic transmission —called "Ultramatic Drive"—which is a combination of torque converter and direct drive. Of the torque converter type, the unit features a 3-element converter with but one reactor stage for torque multiplication. It attains torque multiplication of the order of 2.4 to 1.

The direct drive clutch—mechanical type—is designed to function properly in solid oil. Clutch is applied hydraulically through action of a special centrifugal governor. Converter is used only for acceleration and cuts out automatically by selective action of the governor and throttle pressure when direct clutch is applied.

This feature provides direct mechanical coupling for most driving conditions. It gives a reduced engine speed at maximum throttle, feel of direct drive, and improved fuel economy. Under ordinary conditions, direct clutch is engaged at about 15 mph. with part throttle, but throttle pressure can overrule governor even with maximum throttle up to about 50 mph.—Motor Age, May, p36; Amer Auto, June, p70

World's Largest Cat Cracker

Now being installed at Standard Oil Co.'s New Jersey Bayway refinery is by far the world's largest catalytic cracking unit. Design capacity is 41,000-bbl.-stream-day.

The unit is characterized by its extreme simplicity. The cracking section consists of only two main vessels—reactor and regenerator. The reactor is 35 ft. in dia.; the regenerator is 55 ft. in dia. and is composed of a 20-ft. cylindrical section with a hemispherical head and cone bottom. Over-all height of the cracking structure is 160 ft.—Oil & Gas J, Mar 24, p164

Industry Finds Three Uses for Synthetic Detergents

Synthetic detergents have three general uses: (1) cleaning, (2) changing physical characteristics of other materials, and (3) acceleration of processes.

Internal cleaning of equipment can often be done without disassembly by passing through it a synthetic detergent, either alone or with a suitable acid or alkali. Heat exchangers may be cleaned this way. If lime scale must be removed, the detergent can be added to a muriatic solution.

Second general use of synthetic detergents is illustrated in making blotting paper and paper towels. A dilute solution of the wetting agent is sprayed onto the paper during final drying, thereby increasing the amount of water the paper will hold and its pickup rate.

Another such use is as an air-entraining agent in cement, dentrifices, and plasterboard. In a concrete highway, air-entrainment increases resistance to freezing and thawing cycles.

Third general use—to accelerate processes—is due to reduction of surface tension by the detergent. An example of this type of use is in washing of coal and the resulting better drainage. Other examples include acceleration of filtrations, reduction of soaking time for humectant into tobacco, and use of wetter water in fighting fires.—Chem Eng, May, p153

Welding Aluminum Products

Strong joints in aluminum products are attained by inert-gas-shielded arc welding at Vogt Bros. Mfg. Co. An example is in shower-stall bases formed from 3-S half-hard, 0.064-in. sheet. Corners are welded in pivoted fixture. Edges to be welded are wiped with a rag wetted with carbon tetrachloride to remove grease.

The arc is struck on a steel angle of the fixture and moved quickly to aluminum edges. Metal from aluminum filler rod is fused with molten edges. A single operator can load and unload fixture and make 500 welds per 8-hr. day.—Weld Eng, Apr, p36

Cab-Over-Engine Helicopter

Unusual in configuration and with a high weight-to-power ratio, Dorman Helicopters, Inc.'s, new "Pelican" is expected to fly by September. With a gross weight of 3,200 lb. and a useful load of 1,400 lb., it is powered by a 245-hp. engine. Pilot and co-pilot will sit above the engine housed in the nose; five passengers sit aft.

Highly flexible blades rigidly attached to hub eliminate necessity of hinging, dampers, and bearings. The rotor head has been in test for a year. Craft is 35¾ ft. long; main rotor is 45 ft. dia.—Aviation Wk, Mar 28, p14

PLASTIC CASE CUTS TV COST

Admiral Radio Corp. cut sharply the cost of its console cabinet television set by using a 35-lb., 1-piece molded plastic cabinet—the largest plastic molding yet made. Mold weighs 8 tons. High-frequency electrical field preheats plastic before it is loaded into mold. Two men turn out 10 cabinets per hr., as against 6 hr. for wood cabinet. Plastic cabinet is shown at left, set at right.—Business Wk, May 14, p78

How To Cut Costs

Cutting Production Costs Keeps You Ahead of Your Competition

— Report to Management —

THE POST-WAR EASY MARKETS are past—both in the U.S. and abroad. Supply lines are filled or almost so. More manufacturers are in the field. Competition for sales is keen and will become keener. One way to make sure you get your share of business is to produce goods that will sell at a lower price than those of your competitors.

How can you reach that lower selling price?

You can **cut production costs.**

Never has it been so necessary to bring down costs and thus bring down selling prices.

As population grows—and it is on a sharp curve up—more people are thrown into the world's labor force. That means more jobs. Purchasing power of the people must be kept up. It should be raised. And to raise that purchasing power and the workers' standard of living, higher wages must be paid. This is good as long as productivity increases in proportion to wage raises.

Another way to raise wages is to lower prices—prices of finished goods, raw material, and equipment. The third and best way to bring about the raised standard of living is a combination of these two ways.

A thorough-going program of production cost cutting can bring about this combination. Such a program will bring about a greater output per man-hour. It will bring prices down. It will make more jobs available wherever applied.

Only by cutting costs can manufacturers today be certain that they will get their share of tightening markets. Cost cutting is a long-term program that needs day-to-day attention if you are to maintain the competitive position of your product. This report on organization for cost cutting is the first of a series.

The new machines and equipment being designed, the new processes developed, the new materials discovered, the new methods being evolved cannot do the job themselves. They must be applied to reach the desired end. This requires a procedure of analysis, study, evaluation and calculation, engineering, and testing.

A well-planned program of cost cutting does these things most effectively. Such a program can be applied to the manufacture of any product.

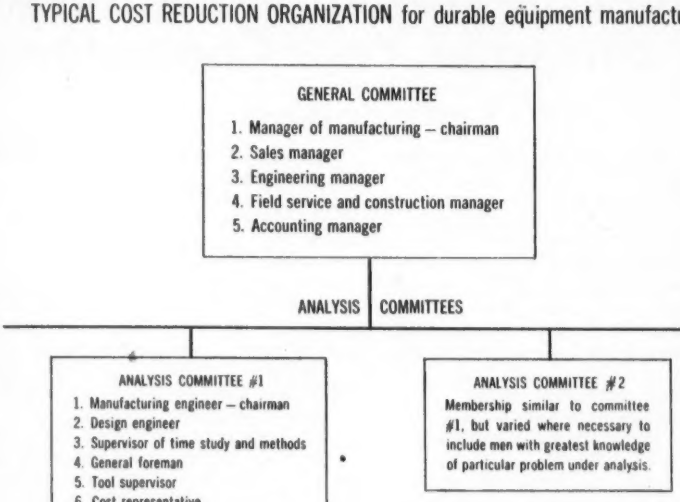
Products are improved and costs lowered by analysis of design, materials, processes, manufacturing operations, machine tools, equipment, tooling, plant layout, and materials-handling facilities. Good clerical procedures, inventory control, sound purchasing policies, budgetary controls can assist in bringing costs down.

Cost cutting is not something that can be followed for a short time and then be discarded to be resumed at a later date. Cost cutting is a long-term program that must be watched continually.

Cost-cutting principles are applied differently in each industry to which it is applied. Application will be different in textiles, chemicals, metal-working or petroleum industries.

There are so many phases of cost cutting and so many factors contributing that all the potential improvements

TYPICAL COST REDUCTION ORGANIZATION for durable equipment manufacturer


GENERAL COMMITTEE
1. Manager of manufacturing – chairman
2. Sales manager
3. Engineering manager
4. Field service and construction manager
5. Accounting manager
ANALYSIS COMMITTEES
ANALYSIS COMMITTEE #1
1. Manufacturing engineer – chairman
2. Design engineer
3. Supervisor of time study and methods
4. General foreman
5. Tool supervisor
6. Cost representative
ANALYSIS COMMITTEE #2
Membership similar to committee #1, but varied where necessary to include men with greatest knowledge of particular problem under analysis.

and savings cannot be realized unless a systematic cost-cutting procedure is followed. The steps to be followed are neither universally known nor understood. But to assure that all possibilities are covered, a well defined plan of analysis must be set up.

Procedure to Follow

To obtain this systematic procedure for cost cutting, the following must be done:

1. Define the program objectively.
2. Appoint a cost-cutting committee.
3. Study commercial, economic, engineering, and manufacturing aspects of each product
4. Select products, materials, and parts on which cost-cutting analyses are required.
5. Form an analysis committee.
6. Instruct and train this committee
7. List steps to be taken.
8. Describe each step in detail.
9. Outline work in each step.
10. Furnish illustrations and examples to assist in analysis work.
11. Set up consulting service with departments not represented on the committee.

The cost-cutting committee directs the whole program, sets procedures, appoints analysis committee, trains and instructs members of that committee. The overall committee may prepare procedures for manufacturing analysis and cost cutting or may appoint persons with more technical knowledge to do this work. In some cases, procedures should be prepared by the company, or even better, in the plant in which the analysis work is to be carried out.

PLANNING THE PROGRAM

The over-all cost cutting committee udies the major phases of cost cutting, cluding:

1. **Financial**—investments, costs, profs, inventories.
2. **Commercial**—size of market, comany's share of that market, customers' ceptance of the product.
3. **Competitive**—delivery, appearance, ality, price of the product.
4. **Application**—suitability for applicaons, performance, r , air charges.
5. **Engineering**—product design and velopment.
6. **Manufacturing**—facilities, replaceent, plant layout.
7. **Organizational structure**—evaluaon, personnel, training, instruction.

The program must be consistent with e commercial plan for the industry, recnizing: (1) products' importance to the dustry; (2) evaluation of relative imrtance of each product; (3) volumes pected from each product; (4) competion for each, including quality, price, rformance, delivery; (5) profit possibily; (6) means to improve user acceptnce; (7) new designs to be offered; and 8) promotion by sales department.

The general cost-cutting committee hould include the works manager or anager of manufacturing, design engieer, sales manager, construction manger, works accounting manager, and urchasing agent. This group will assure at all phases of the manufacturing peration important to the cutting of osts are covered at the upper level.

To make the program fully effective, he committee must study the commercial tuations that apply to various lines of roducts. Close coordinaion is necessary ith the responsible organization of the lant where cost-cutting work is to be one. Procedural manuals must be prepared.

Procedures for manufacturing analysis and cost cutting are usually presented in several forms—manuals, sound slides, moving pictures, physical demonstrations, prepared discussions, and worked-out examples.

On completion of the plans, they are presented to top management. When executive management has approved the program, the program should be presented to the entire company organization. The program drafted cannot be a success unless it has complete approval and support of all—management and workers.

CARRYING OUT THE PROGRAM

Based on its study of general phases of the operation, the general cost-cutting committee gives guidance to the analysis committee. This latter committee should be selected with the following in mind regarding its members: their position in the company, responsibility for production and cost reduction, and ability to do analysis and cost-reduction work.

In manufacturing there are few persons who do not have some effect on product cost. But, some have more effect upon final cost than others and from this group the analysis committee should be selected.

Committee Composition

In general the committee should include: manufacturing engineer, general foreman of manufacturing department, time-study supervisor, product design engineer, tool supervisor, and cost representative (see chart p60).

Manufacturing Engineer—He usually serves as chairman of the analysis committee because of his familiarity with over-all operation. He may well serve as chairman of several analysis committees if more than one committee is in operation in the plant.

General Foreman—He is responsible for the manufacturing operations in his department. He has a direct interest in

product cost and is responsible for making operations work in his department.

Time-Study Supervisor—Costs are his main concern. Cost reductions and methods improvements are his continuous responsibility. He can give advice as to date and analysis of the committee's final recommendations.

Design Engineer—Being responsible for the proper performance of the finished product, he approves all changes in product design and specification. Since much cost cutting may result from changes in design, he has a major position on the committee.

Tool Supervisor—Responsible for tool design and toolmaking and often machine tools and equipment procurement, he must be included. Labor time and rate going into the product are to a major degree fixed by the machines, tools, and jigs and fixtures used in the manufacture of the product.

Cost Representative—He should furnish the committee with detailed cost information. He makes cost analyses and estimates for proposed improvements and compiles cost-reduction reports.

The analysis committee will call in other departments for consultation—quality-control, purchasing, production-planning, scheduling, and construction.

Quality-Control Department—As the department is responsible for interpretation of manufacturing specifications and tolerances, it furnishes consultation and advice to other committees. As proposals for cost cutting may entail design and methods changes, specifications and tolerances will change. These changes must be approved by the quality-control department representative. The department gives the committee information on defective materials purchased and defective workmanship. This information is used by the analysis committee to determine whether new materials, designs, or methods will help cut costs.

Purchasing Department—Information on material prices, economical quantities, standard shapes, mill sizes, commercial tolerances, specifications, and deliveries is furnished by this department. This is necessary when studying material costs and substitutions.

Production Department—This department includes production planning, scheduling, and inventory control. It gives the committee information on planned production scheduling, activities of components and parts, stock balances of material, manufacturing quantities, procurement time for various materials, processing time for various parts, difficulties of processing and mnufacturing the various components.

Construction Department—From this department comes information on field installation of products, customer acceptance, parts causing dissatisfaction, parts difficult to install, methods for packaging for convenience of customers, handling facilities for installation of the product in the field.

If the plant manufactures several products, it is advisable to have different personnel on the analysis committee for each product. Or if the plant makes only one product but that product has several major components, the same applies. If several products (or various components of one product) are being studied, several analysis committees should operate at once.

Some Training Necessary

It may be necessary to give fundamental training to the analysis committee. Cost-cutting principles must be fully explained. Training should be along the specific line of each member of the committee.

Generally the over-all cost-cutting committee meets once a month. The chairman of the analysis committee attends for his study group. These over-all committee meetings are held to hear reports, check progress, assign future studies to the analysis group.

ow To Cut Costs

ROVIDING COST-CUTTING TOOLS

Good workmanship reflects good tools. uccessful cost cutting too necessitates ood tools properly handled. List of tools vailable to committee is long.

It includes, in part: general technical nd engineering knowledge; intimate nowledge of products, their design ap- lication, function, and manufacturing etails; knowledge of available materials; kill in analyzing details; professional onesty; ability to evaluate production; bility to estimate production time and ost; ability to visualize all operations oing into the product.

From this partial list of attributes for good analyst, it can be seen that many an be gained or improved by training. thers are inherent and cannot be in- tilled in short-training sessions.

Of Assistance To Analysist

Information that will help the analysis committee should be presented to it in the best possible form. Below is a list of matters that members of the committee should be fairly familiar with:

1. Manufacturing engineering.
2. Manufacturing operation analysis.
3. Methods improvement.
4. Work simplification.
5. Cost analysis.
6. Time study.
7. Motion study.
8. Motion picture and film analysis.
9. Clerical functions analysis.
10. Manufacturing process charts.
11. Machine-tool application.
12. Equipment application.
13. Multiple machine operation.
14. Plant layout.
15. Materials-handling methods.
16. Tooling methods.
17. Casting metods.
18. Forming methods.
19. Cutting methods and material removal.
20. Methods of joining materials together.
21. Product design engineering.
22. Material and process engineering.
23. Chemical analysis.
24. Physical-properties tests.
25. Inventory control.
26. Sound purchasing.
27. Economical manufacturing quantities.
28. Budgetary control of operating expense.

Various Forming Methods

Let us look at just two manufacturing methods listed above—casting methods and forming methods.

Several casting methods are available —green sand, dry sand, loam, permanent mold, precision (lost wax), plaster mold, die, centrifugal, and injection mold. Green-sand casting, for instance, may be done by:

1. Bench molding with wooden patterns.
2. Vibrating machine molding with metal patterns.
3. Squeezer machine molding with metal patterns.
4. Roll-over machine molding with wood or metal patterns.
5. Floor molding for large castings.
6. Pit molding for very large castings.

Sand may be hand-conditioned or machine-conditioned. It may be hand-rammed or machine-rammed. Metal can be melted in a cupola, electric furnace, or a gas-fired furnace. It can be poured in several ways. All the various methods have a direct bearing on cost, quality, and methods.

Study Possible Methods

If forming methods are used to produce parts, possible methods include: forging, hot pressing, cold coining, drawing through dies, stamping, drawing from flat stock, extruding, bending, stretching, spinning, hobbing, powder metallurgy.

Forging has various possible methods —hammer forging, drop forging, press

forging, upset forging, and cold heading. Each method needs careful study. Each one demands its own special tools and equipment, varying in initial cost, upkeep, cost to operate. All are reflected in the final product cost.

Experience has proven that it is difficult to supervise and keep sharply focused on major objectives. The plan must be adhered to. Meetings of the analysis committee are for these purposes: to receive reports on assigned projects; to reach agreement on reports, suggestions, and recommendations; to delegate new projects for study.

Over-all cost-cutting committee should require periodic reports from the analysis committee. If projects are of short duration, reports should be submitted at the completion of the project. If the project is of several months duration, periodic progress reports should be submitted. No longer than 6 weeks should pass without a committee report.

The chairman of the analysis committee gives oral reports at meetings of the cost-cutting committee in addition to the formal written reports. These cover progress made, difficulties encountered, improvements and savings expected. The cost-cutting committee too must make periodic reports to top management.

Cost savings are usually not realized until new methods are put into operation. After new methods are in operation, systematic follow-up is necessary. The follow-up rests with the chairman of the analysis committee. The over-all committee serves as a watchdog committee on follow-up.

One follow-up procedure often used is the ratio of works delivery cost to net sales billed by lines. If end-results are unsatisfactory, necessity for additional investigation by the committee is indicated.

Mere cost cutting at one period, of course, is not the true end result. It will need investigation tomorrow. Competitive position of a product changes frequently, and progressive companies constantly attempt to keep their products in front competitively in their field.

Emphasis on cost cutting will be shifted from time to time in large companies because of the varying products. But the cost-cutting program is not abandoned.—Factory, May, p65

Cost Cutting Is Management's Big Job Today

In subsequent issues of the McGRAW-HILL DIGEST we will continue to tell the story of how you can cut costs in your business. Rising costs and tightening markets make this managerial subject your most important problem. It will keep your products abreast of your competitor.

The September issue of the DIGEST will tell you how to cut costs through better design. Better designs affect almost every industry. You can learn new tricks from this coming "Report to Management."

January 1950 issue will do a complete roundup on cost cutting ideas in all branches of industry. "How To Cut Costs" will be a 24-page bonus in that issue. You cannot afford to be without these new ideas that this roundup will convey.

In intervening months the DIGEST will continue to bring you other phases of cost cutting important to you.—The Editors

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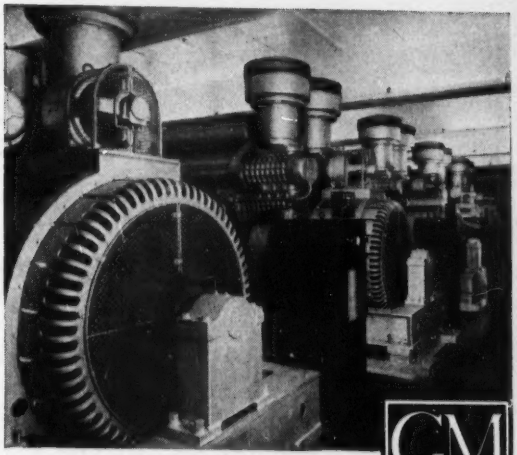

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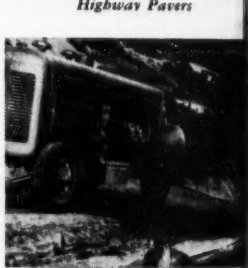
Highway Pavers

Ship Salvaging Operation During the late World War



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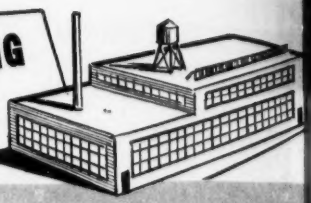

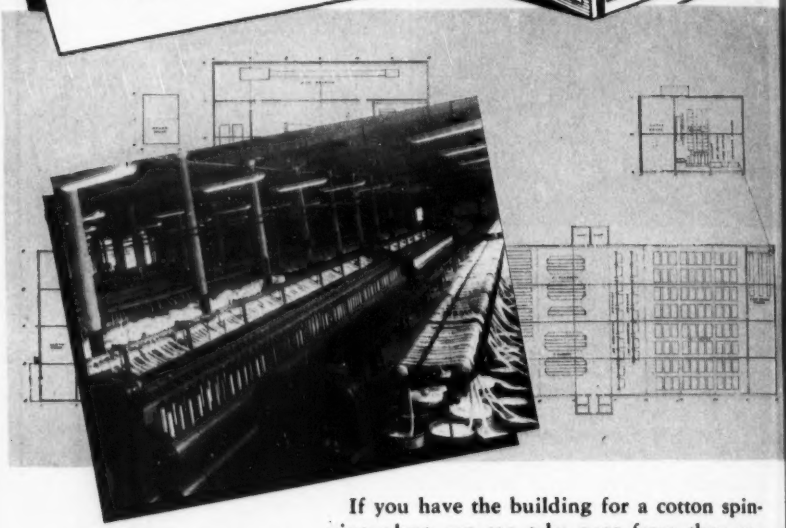

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If you have the building for a cotton spinning plant, we can take over from then on. In addition to manufacturing the machinery you need, we can figure what machines and how many you require for a given yarn organization, and lay out a floor plan which will assure efficient straight-line production.

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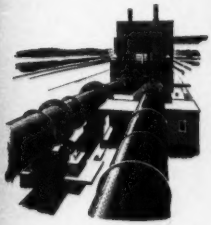

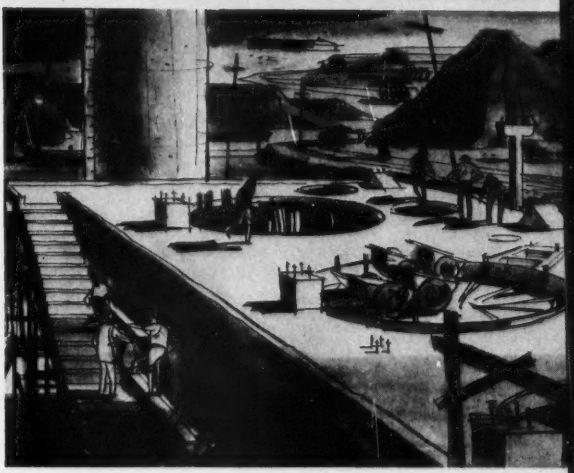

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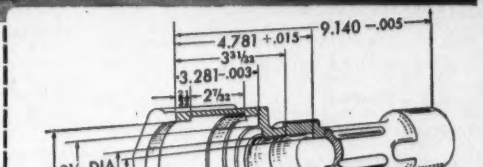

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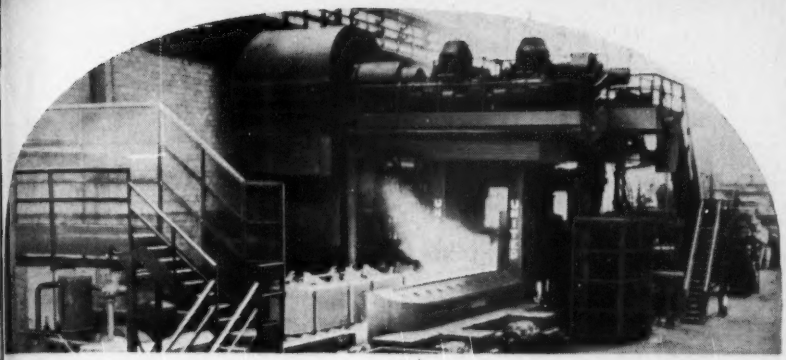

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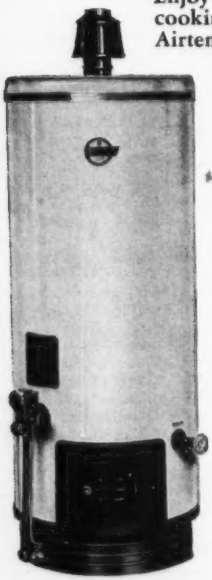

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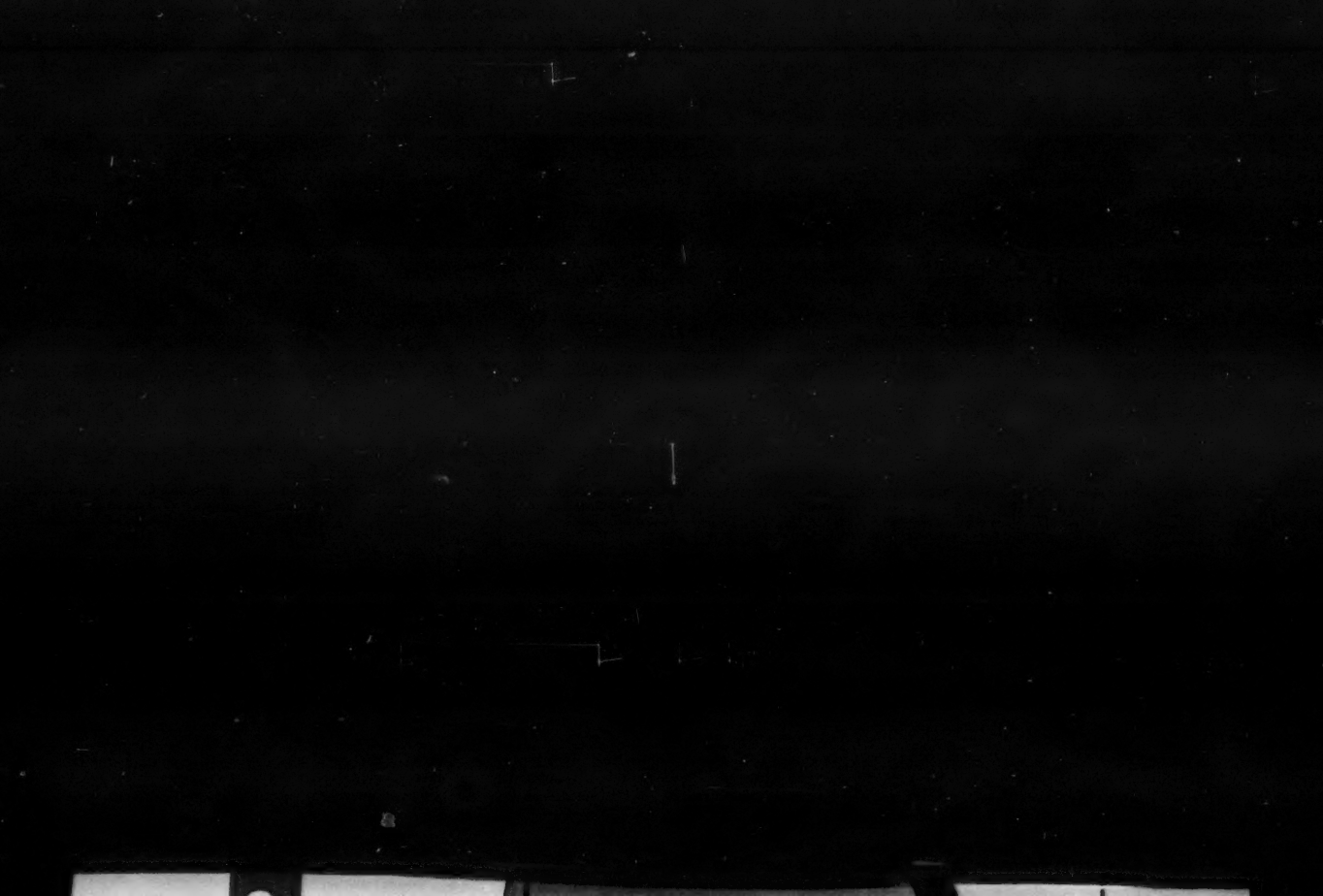
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